



AGENCY FOR HEALTHCARE RESEARCH AND QUALITY



AHRQ National Webinar on Transforming Healthcare Through Patient-Generated Health Data Integration

Presented by:

Deborah J. Cohen, PhD
Ida Sim, MD, PhD
Leslie Lenert, MD, MS

Moderated by:

Chun-Ju (Janey) Hsiao, PhD
Agency for Healthcare Research and Quality

February 22, 2022

Agenda



- Welcome and Introductions
- Presentations
- Q&A Session With Presenters
- Instructions for Obtaining CME Credits

Note: You will be notified by email once the slides and recording are available.

Presenter and Moderator Disclosures



Deborah J. Cohen, PhD
Presenter



Ida Sim, MD, PhD
Presenter



Leslie Lenert, MD, MS
Presenter



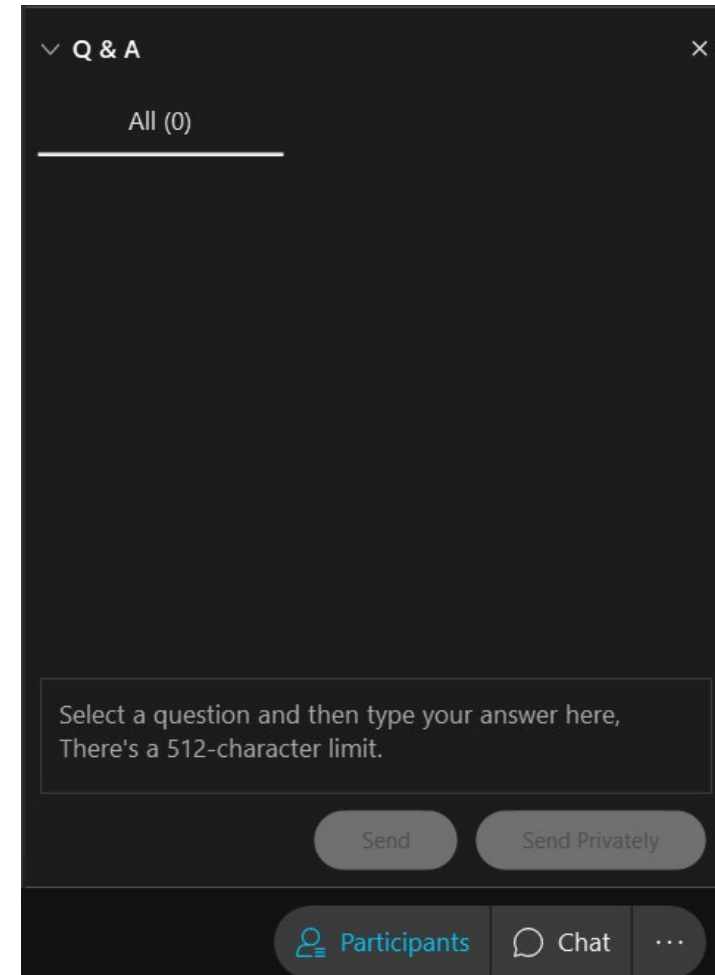
Chun-Ju (Janey) Hsiao, PhD
Moderator

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- Panelist Disclosures: Dr. Cohen, Dr. Sim, and Dr. Lenert have no relevant financial interests to disclose.
- Moderator Disclosures: Dr. Hsiao has no relevant financial interests to disclose.
- AffinityCE, SD Solutions, and AHRQ staff, as well as planners and reviewers, have no relevant financial interests to disclose.
- Commercial support was not received for this activity.

How to Submit a Question

- At any time during the presentation, type your question into the “Q&A” section of your WebEx Q&A panel.
- Please address your questions to “All Panelists” in the drop-down menu.
- Please include the presenter’s name or their presentation order number (first, second, or third) with your question.
- Select “Send” to submit your question to the moderator.
- Questions will be read aloud by the moderator.

A screenshot of the WebEx Q&A panel interface. At the top, it says "Q & A" with a dropdown arrow and a close button. Below that, it says "All (0)". The main area is a large text input field with a placeholder text: "Select a question and then type your answer here, There's a 512-character limit." At the bottom of the input field are two buttons: "Send" and "Send Privately". At the very bottom of the panel are three buttons: "Participants" (with a person icon), "Chat" (with a speech bubble icon), and a three-dot menu icon.

Learning Objectives

At the conclusion of this webinar, participants should be able to:

1. Understand the current state and recommendations of patient-generated health data (PGHD) integration.
2. Learn different technical architectures and workflows that support the collection and integration of standardized PGHD, either self-reported by patients or directly from devices.



AGENCY FOR HEALTHCARE RESEARCH AND QUALITY



Integrating Patient-Generated Health Data into EHRs in Ambulatory Settings

Deborah J. Cohen, PhD

Professor, Department of Family Medicine
Oregon Health & Science University School of Medicine

Overview and Learning Objectives



Overview

- Findings and recommendations from an environmental scan related to PGHD integration in ambulatory settings (Led by Duke University's Ryan Shaw and OHSU)
- Identify key areas of development and learning related to PGHD integration (practical guide development (Led by OCHIN's Dave Boston and OHSU)

Learning Objectives

- After participating in this session, the learner should be better able to:
 - ▶ Identify the potential impact of integrating PGHD in ambulatory settings
 - ▶ Understand the state of the evidence related to PGHD integration

You can find our full report here: <https://digital.ahrq.gov/sites/default/files/docs/citation/pghd-environmental-scan.pdf>

You can find the PGHD toolkit here: <https://digital.ahrq.gov/sites/default/files/docs/citation/pghd-practical-guide.pdf>

Methods

- Environmental Scan
 - Peer-reviewed literature
 - Grey literature
 - Vendor survey and interviews
- Practical Guide Development
 - Leveraged input from the scan
 - Engaged stakeholders in informing and reacting to content
 - Tested and refined guide based on user feedback

Findings from the Environmental Scan



Findings: Scoping Review

- Identified 36 peer-reviewed papers on integration of PGHD into EHRs across a range of ambulatory settings
- Types of PGHD included biometric data, questionnaires, and health history
- Diabetes was the most common patient condition (27.7%)
- Apple HealthKit was the most common developer format (25%)
- Themes emerged regarding authentication, resources requirements, patient technical support and training, data delivery to the EHR, data management, and preferences for review

Findings: Guides and Resources

Topics covered included:

- How to select and integrate PGHD in ambulatory setting
- Information about Federal-level legislation governing
 - Data privacy
 - Standardization reimbursement and regulation

Findings: Vendor Perspectives

Growing evidence for PGHD-EHR integration is reflected in the vendor feedback

- Vendors are partnering with institutions to leverage PGHD to improve health outcomes and care coordination
- iOS HealthKit is commonly used due to its maturity, which provides data and security standardization
- Few health systems and EHR vendors directly integrate with Google's Android platform
- The use of interoperability standards such as HL7 and FHIR is growing
- Investment, commitment, and understanding of the many variables that influence successful PGHD integration is vital




Contents of the Practical Guide

Recommendations

1. Develop a strategy or blueprint
2. Identify champions and early adopters
3. Tie PGHD to a care delivery model
4. Design the workflow
5. Use a patient-focused approach with a health equity lens
6. Leverage a robust technology architecture
7. Create data governance

Recommendations

8. Create device guidance
9. Provide guidance and education to stakeholders
10. Implement and adapt through iteration
11. Evaluate against metrics and goals
12. Plan for maintenance and scaling
13. Provide technical support



Integrating Patient-Generated Health Data into Electronic Health Records in Ambulatory Care Settings: *A Practical Guide*

Contents of the Guide



Folio 1: Introduction: What is Patient-Generated Health Data and Why is it Important?

Folio 2: Assessing Readiness for PGHD Program Implementation

Folio 3: Assembling a Team to Manage Change

Folio 4: Making the Right PGHD and Information Technology Decisions for Your Practice

Folio 5: Evaluating the Costs of PGHD Implementation

Folio 6: Steps to Successfully Implement a PGHD Program

Practical Guide: 1. Introduction



Key Learning Concepts

- Definition of patient-generated health data (PGHD).
- Integration of PGHD into the electronic health record (EHR) provides clinical decision- making support.
- Benefits of PGHD include increased patient engagement, fuller pictures of health, and more timely interventions.
- The uptick in virtual care adoption provides support for PGHD.
- Efforts to attain health equity should be baked into program planning.
- How to Use This Practical Guide.

Practical Guide: 2. Assessing Readiness






























Key Learning Concepts

- PGHD integration may mark a significant change in your practice.
- Incorporate perspectives of staff into PGHD implementation planning.
- Incorporate patient perspectives on PGHD to achieve greater equity and satisfaction.
- Assess your practice and patients for readiness.

Active Learning Exercises

- ACTIVITY 2.1: Organizational Readiness
- ACTIVITY 2.2: Gauge Motivation from Patients and Colleagues
- ACTIVITY 2.3: Roadmap to PGHD Implementation: Key Considerations Relevant to Patient Participation

Potential Solutions to Common Patient Barriers to PGHD Use

Barriers						
Solutions		 Lack of Internet access	 Low health IT proficiency	 Dexterity	 Vision	 Language
	 Patient education and instructions					
	 Technical support					
	 Multiple media					
	 Multiple languages					
	 Community partnerships					
	 Wi-Fi hotspots					

Practical Guide: 3. Assembling a Team

Key Learning Concepts

- Build the team: Identify stakeholders and find your champions.
- A PGHD Coordinator could be crucial to success.
- External partners are powerful allies.

Active Learning Exercises

- ACTIVITY 3.1: Identify Your Team of Champions
- ACTIVITY 3.2: Assemble a Core PGHD Workgroup

Practical Guide: Tools to Assist with Developing the PGHD Implementation Team



QUALITY REPORTING CHAMPION

- Ensure your practice meets PGHD implementation reporting requirements for regulatory programs, certifications, alternative payment programs (e.g., patient-centered medical home recognition, uniform data system reporting, accountable care organizations).
- Monitor for opportunities to participate in PGHD implementation incentive programs.
- Partner with EHR vendors to automate PGHD-related data capture for reporting purposes.

INFORMATION TECHNOLOGY CHAMPION

- Assess bandwidth and equipment needs in various settings (e.g., exam room, remote office, patient home).
- Consult on technology solutions and equipment vendors.
- Install, configure, test, and maintain PGHD implementation hardware and software.
- Support patients with initial setup/validation/calibration for prescribed remote monitoring devices, fitness trackers/wearables.
- Assist with staff and patient PGHD implementation training and troubleshooting.
- Coordinate with MTT assisting patients in their homes.
- Work with EHR vendor to ensure interoperability for seamless, bidirectional PGHD exchange.

Practical Guide: 4. Making Decisions

Key Learning Concepts

- Identify information technology best suited to your PGHD implementation.
- Legal, compliance, and security factors must be considered ahead of implementation.

Active Learning Exercises

- ACTIVITY 4.1: Roadmap to PGHD Implementation: Key Health IT, Legal, Compliance, and Security Considerations

Practical Guide: How to Select Devices



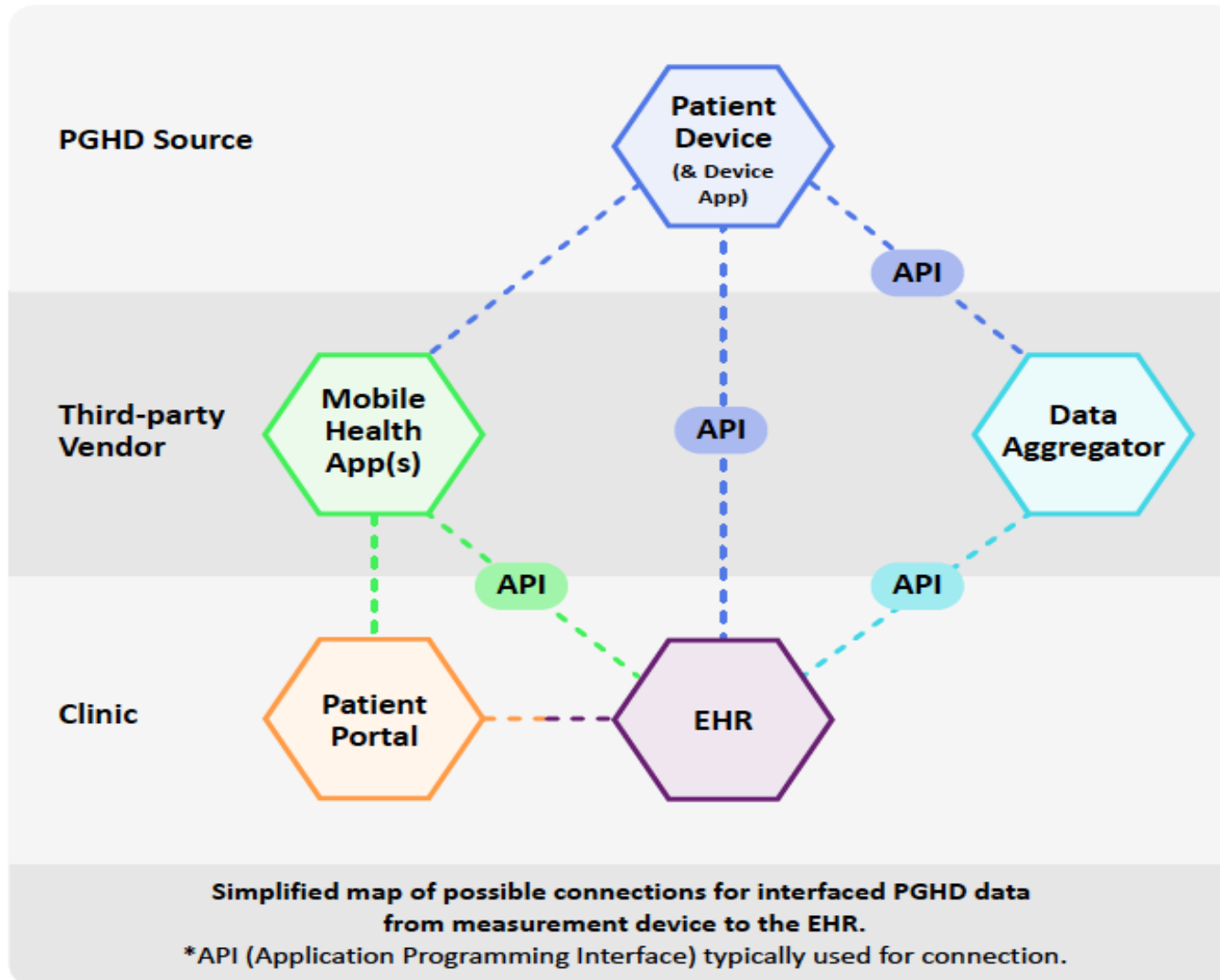
Selecting Devices for Your PGHD Program: By consulting with your EHR vendor to identify the best device options for your EHR, you will narrow your range of options. You may want to test some sample devices to compare quality, costs, usability, and functionality on different mobile devices, such as iPhone and Android smartphone platforms. Your selection decisions should also be informed by the following considerations.

Tip: The good news is that you do not have to do all this research and testing yourself. Some EHR vendors furnish PGHD device kits tailored to specific clinical conditions. There are also third-party vendors who offer PGHD packages and/or facilitate EHR integration. Identifying these available options will significantly lighten your workload.

Pathways to PGHD Integration into the EHR: PGHD integration is often complex and dynamic. Some vendors facilitate the integration of data into the EHR directly, while others may require the use of a third-party aggregator that accepts the PGHD data from devices and prepares the data for upload. Additionally, the patient portal may be utilized for patient identification and other communications.

Simplified Connection Network Between a Device and the EHR

Figure 1. Simplified Connection Network Between a Device and the EHR



Practical Guide: 5. Cost

Key Learning Concepts

- Identify factors that will influence your program's financial sustainability.
- Develop a budget to implement, grow, and sustain your program.
- Estimating initial and ongoing costs.
- Identify sources of funding and cost savings.

Active Learning Exercise

- ACTIVITY 5.1: Roadmap to PGHD Implementation: Key Financial, Reimbursement, and Reporting Considerations

Practical Guide: Return on Investment (ROI)



ROI is a common analysis to gauge value. There are multiple ways to look at the financial ROI for PGHD programs in your practice. The billing and reimbursement champion on your team will be able to provide information about the payer rates of reimbursement for various PGHD related services. These figures can be used to develop projections for future PGHD-revenue streams based on anticipated billing volume.

At present, rates of reimbursement are relatively low and will likely not offset all costs related to your PGHD program. As this changes, consider the indirect cost savings generated by a PGHD program.

Estimating Indirect Cost Savings

If you have access to claims and/or EHR data and an expert data analyst, you may be able to guestimate some indirect cost savings. To do this, you may consider conducting some before and after comparative analyses of patients participating in your PGHD program on such topics as healthcare utilization and costs. Ideas you might investigate include the following:

- Frequency of in-office appointments and canceled appointments.
- Increased patient engagement and retention.
- Better patient self-management and health outcomes.
- Fewer missed appointments.

In addition, systemic cost savings related to PGHD integration may be possible. Work with your payers to determine if there are shared benefits for your practice.

Practical Guide: 6. Implementation

Key Learning Concepts

- Set realistic and measurable goals.
- Effectively engage your target group of patients.
- Develop a workflow to support staff engagement and program design.
- Learn before scaling your PGHD program.
- Conduct rapid-cycle tests of change and applying end-user feedback.

Active Learning Exercises

- Activity 6.1: Bringing It All Together: Your PGHD Implementation
- Activity 6.2: Set SMART Goals
- Activity 6.3: Develop Workflows
- Activity 6.4: Evaluate and Refine
- Activity 6.5: Scale Up and Monitor

Practical Guide: Tools and Activities to Assist With Evaluation

A PGHD SMART Framework: Example

- **S – Specific:** Improve BP in 25 patients with uncontrolled hypertension through PGHD.
- **M – Measurable:** Patient BP and BP cuff device usage data are structured and easily retrievable. Survey responses can be summarized, and comments coalesced into prevailing themes.
- **A – Attainable:** Three months is adequate for our clinic to identify patients, disperse devices, and train participants. A subsequent 3 months is adequate to capture and review patient data, schedule followup appointments, assess performance using our metrics, and conduct and assess surveys.
- **R – Reasonable:** It is certainly a worthy goal to improve BP in this population and reduce risk of cardiovascular events. This will also provide valuable insight into the use of PGHD in future population health initiatives.
- **T - Time-bound:** These are clear and achievable. Six months is a tight cycle, but the program involves only a small group of staff and patients

Collaborators



Duke University

- Ryan J. Shaw, Ph.D., R.N.
- Mina Boazak, M.D.
- Gloria Porter, M.S.N., R.N.
- Jedrek Wosik, M.D.
- Rowena Dolor, M.D., M.H.S.

Oregon Health & Science University

- Deborah Cohen, Ph.D.
- LeAnn Michaels
- Martha Snow, M.P.H.
- Sarah Bumatay

OCHIN

- David Boston, M.D., M.S.
- Julie Stone, M.P.H.
- Erica Edwards, M.S.
- Angelea Brown, M.P.H.

Technical Expert Panel

- Victoria Tiase, Ph.D., R.N.
- James McCormack, Ph.D.
- Richelle Koopman, M.D., M.S.
- Steven Kassakian, M.D., M.S.
- Matthew Roman
- James Pantelas

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AGENCY FOR HEALTHCARE RESEARCH AND QUALITY



Toward Individualized Bouquets of PGHD

Ida Sim, MD, PhD

Professor, Department of Medicine,
University of California, San Francisco

Learning Objectives

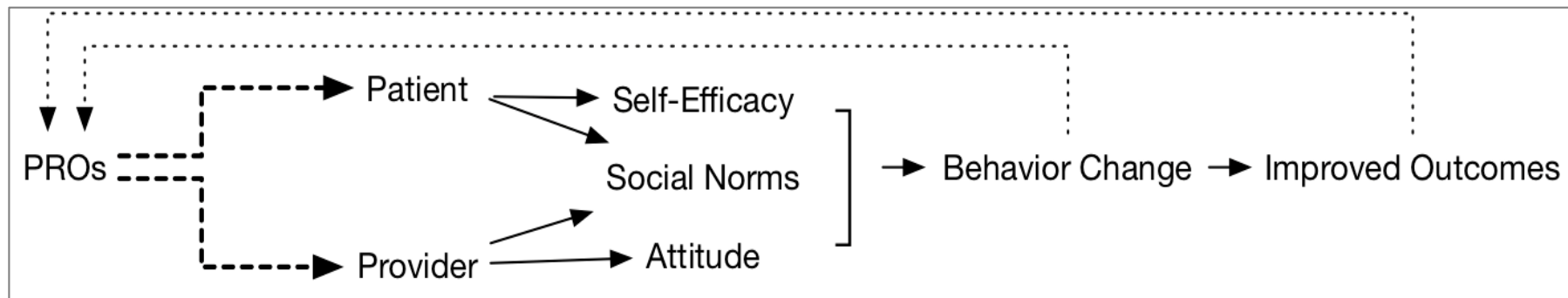
- After participating in this session, the learner should be better able to:
 - ▶ Identify key requirements of integrating patient-reported outcomes into clinical care
 - ▶ Understand key pain points in collection and governance of PGHD
 - ▶ Appreciate benefits of a standards-based public utility approach to patient-generated data

How do our patients *really* feel?

Social Activities Medication Adherence
Pain Cognitive Function
Depression Pain Interference Physical Function
Fatigue
Anxiety Sleep
Health-related Social Needs Loneliness
Perceived stress

Underlying Hypothesis

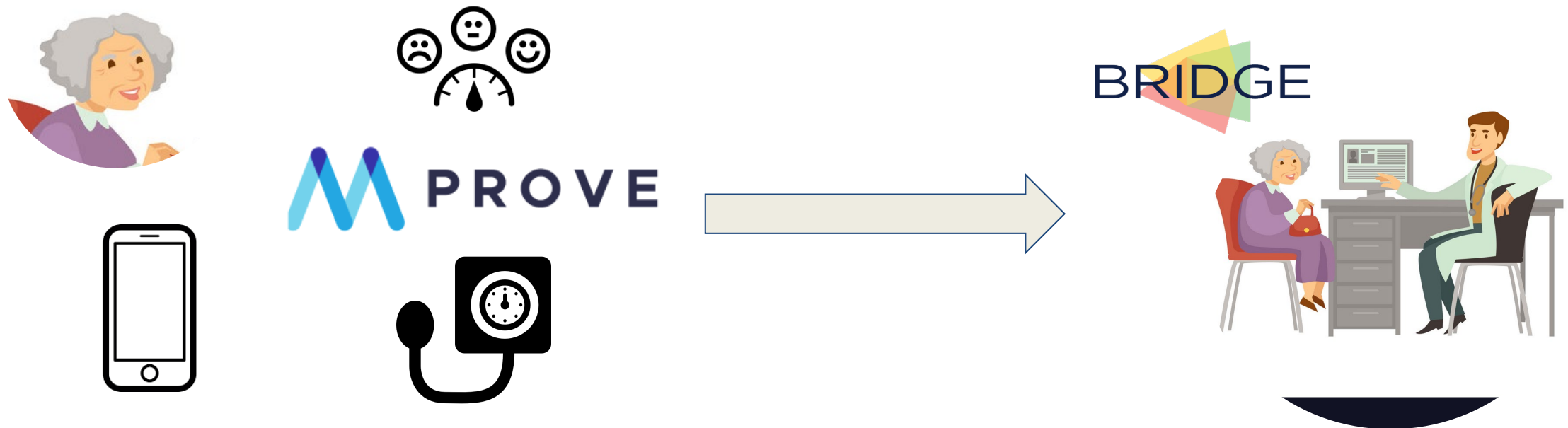
- Patient-reported outcomes (PROs) can improve multiple chronic condition outcomes via two complementary pathways:
 - ▶ Patient self-monitoring with PROs provides feedback and improves self-efficacy for self-management
 - ▶ PROs inform providers of their patients' health experience and enable more patient-centered shared decision making



Theory of Planned Behavior

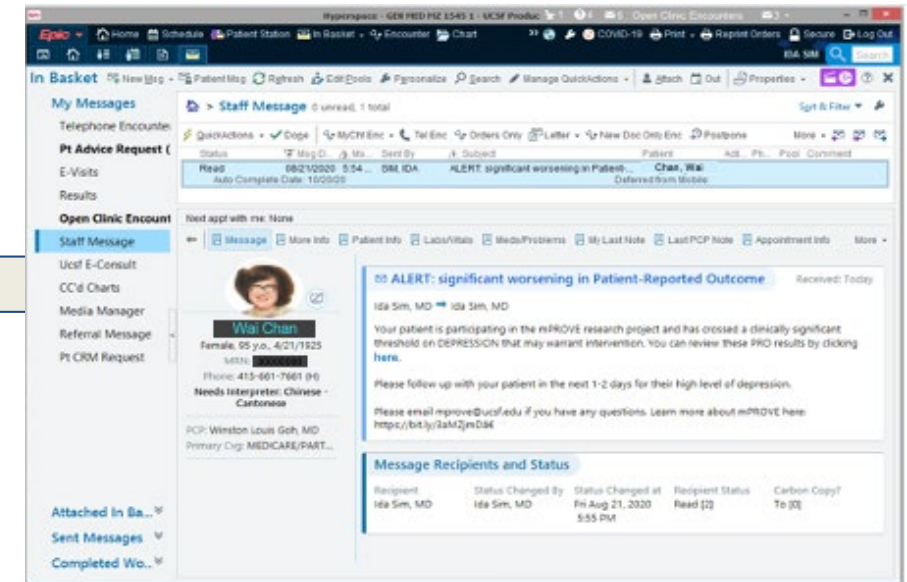
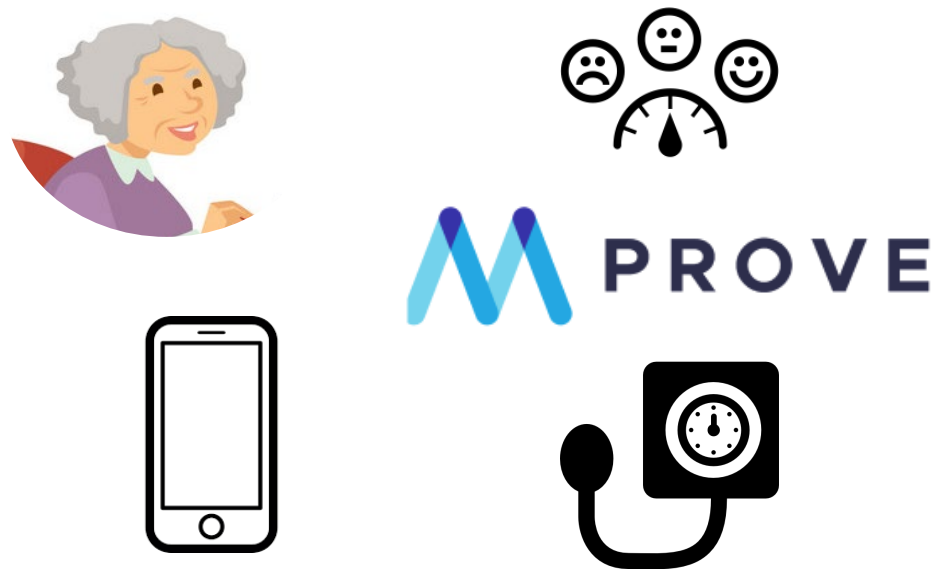
mPROVE Research Project

Enrolling 40 English- and Chinese-speaking patients to track PROs on a smartphone over 6 months. PRO results will be accessible via the BRIDGE dashboard directly within Epic.



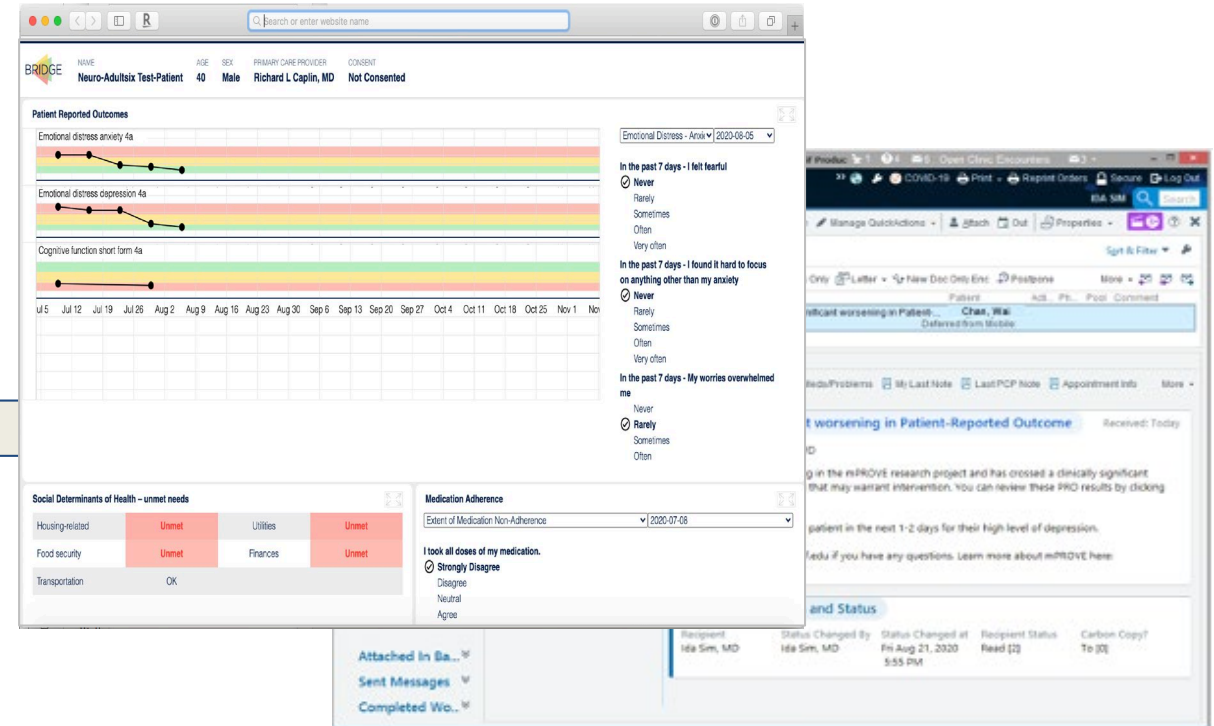
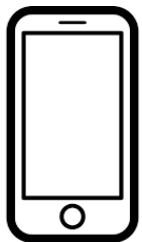
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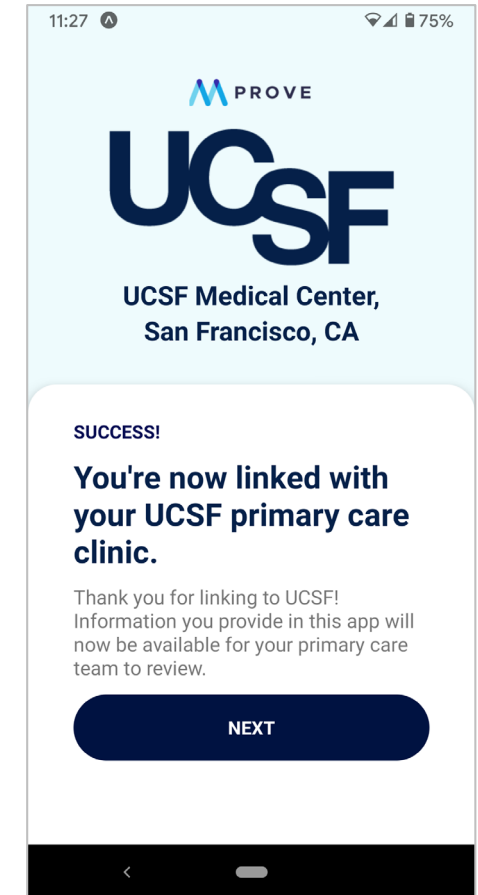
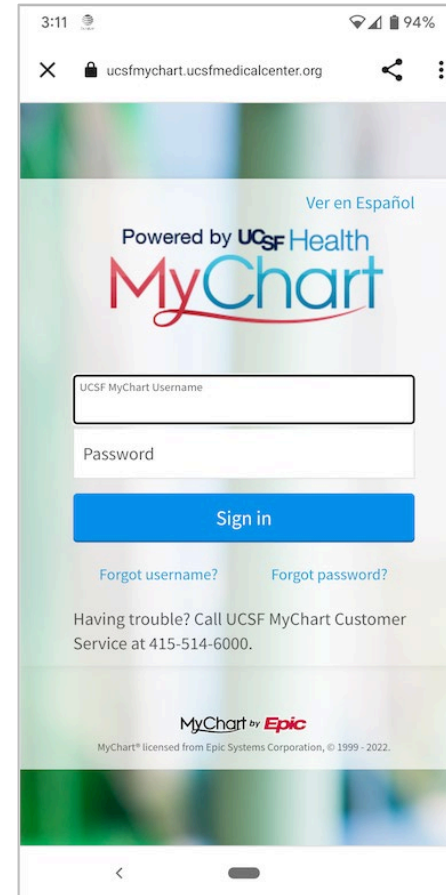
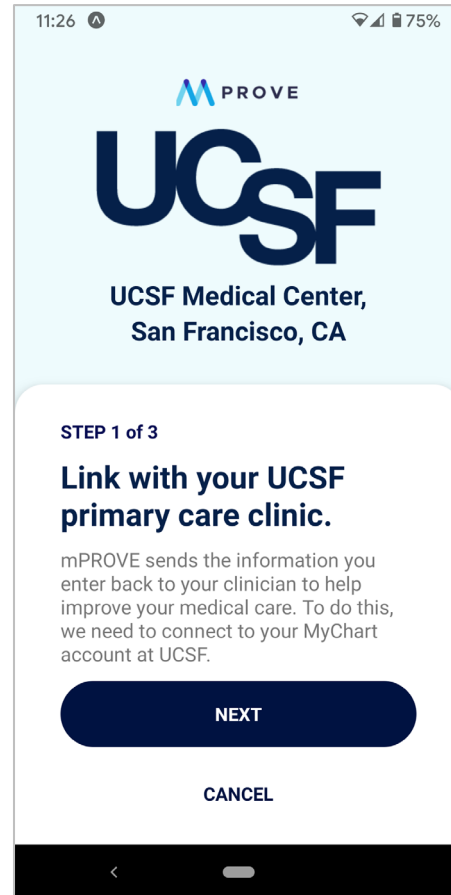
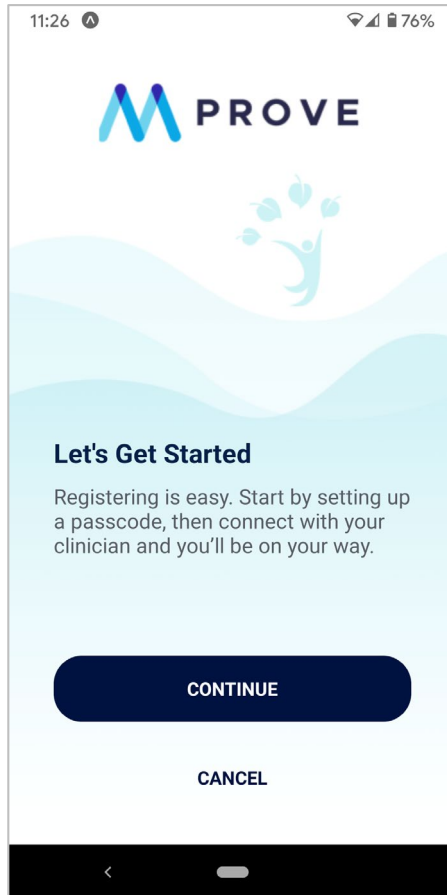


mPROVE Research Project

Enrolling 40 English- and Chinese-speaking patients to track PROs on a smartphone over 6 months. PRO results will be accessible via the BRIDGE dashboard directly within Epic.



mPROVE App



Patients trust UCSF – prominent branding and wording promoting self-efficacy

mPROVE App

11:28 75%

Choose your weekly surveys

Please select or confirm your choices for four surveys that you think are most relevant to you. We'll ask you to respond to these surveys once a week.

2 selected

- Sleep ☒
- Taking your medications ☐
- Depression ☒
- Fatigue ☐

11:29 74%

How you're doing on...

Fatigue – Short Form 4a

1 of 4

During the past 7 days - I feel fatigued









- ☐ Not at all
- ☐ A little bit
- ☒ Somewhat
- ☐ Quite a bit
- ☐ Very much

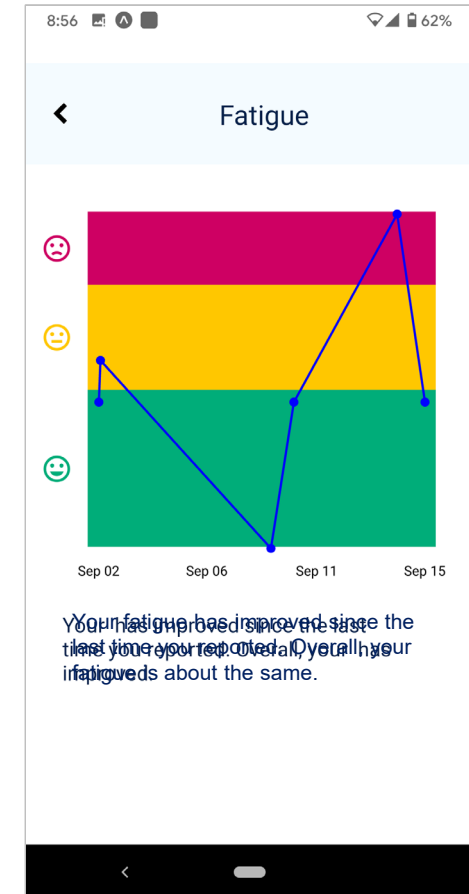
NEXT

8:25 67%

How you're doing

The colored emojis shows your most recent status.

- Anxiety 
- Cognitive Function 
- Depression 
- Physical Function 
- Social Roles and Activities 
- Sleep 
- Fatigue 
- How pain affects you 

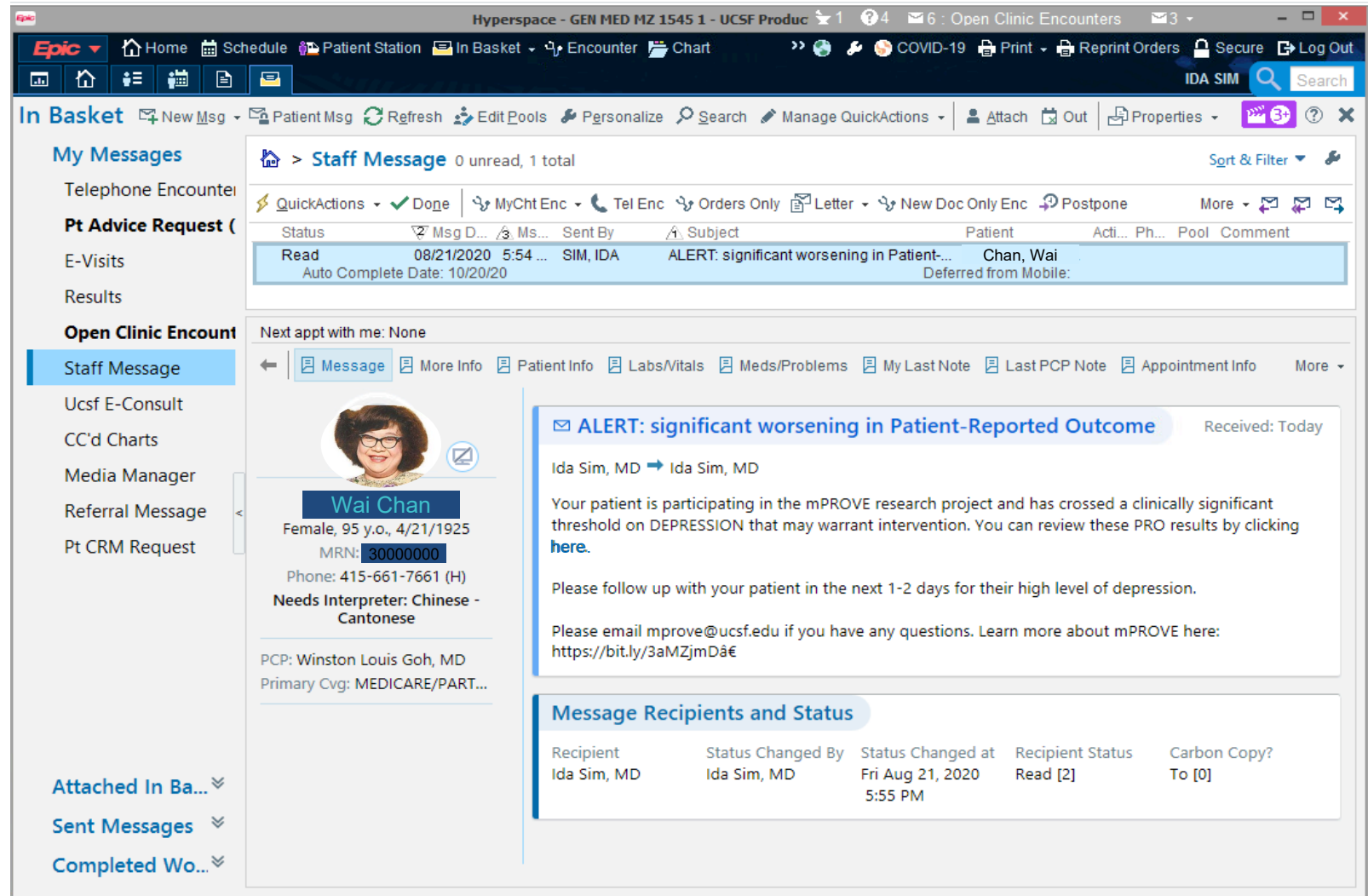


Supporting self-management with PRO tracking

In-Basket: Threshold Warning to PCP

In between clinic visits, if patient PRO exceeds a clinical threshold, PCP gets a staff message.

e.g., Ms. Chan's GAD-7 score is 11 (threshold for alert is 10)



The screenshot displays the Epic In Basket interface. The top navigation bar includes links for Home, Schedule, Patient Station, In Basket, Encounter, and Chart. The In Basket section is active, showing a list of messages. A message from Ida Sim, MD, is highlighted, titled "ALERT: significant worsening in Patient-Reported Outcome". The message content states that the patient, Wai Chan, has crossed a clinically significant threshold on the mPROVE research project for DEPRESSION, warranting intervention. The message also includes a link to review the PRO results and a request to follow up with the patient in the next 1-2 days. The patient's information is shown on the left, including a photo, name (Wai Chan), gender (Female), date of birth (4/21/1925), MRN (30000000), and phone number (415-661-7661). The PCP is listed as Winston Louis Goh, MD. The bottom right section shows the message recipients and status, indicating that the message was read by Ida Sim, MD, on August 21, 2020, at 5:55 PM.

Staff Message 0 unread, 1 total

Status	Msg D...	Ms...	Sent By	Subject	Patient	Acti...	Ph...	Pool	Comment
Read	08/21/2020 5:54 ...	SIM, IDA		ALERT: significant worsening in Patient-Reported Outcome	Chan, Wai				Deferred from Mobile:

Wai Chan
Female, 95 y.o., 4/21/1925
MRN: 30000000
Phone: 415-661-7661 (H)
Needs Interpreter: Chinese - Cantonese
PCP: Winston Louis Goh, MD
Primary Cvg: MEDICARE/PART...

ALERT: significant worsening in Patient-Reported Outcome Received: Today

Ida Sim, MD → Ida Sim, MD

Your patient is participating in the mPROVE research project and has crossed a clinically significant threshold on DEPRESSION that may warrant intervention. You can review these PRO results by clicking [here](#).

Please follow up with your patient in the next 1-2 days for their high level of depression.

Please email mprove@ucsf.edu if you have any questions. Learn more about mPROVE here: <https://bit.ly/3aMZjmdAe>

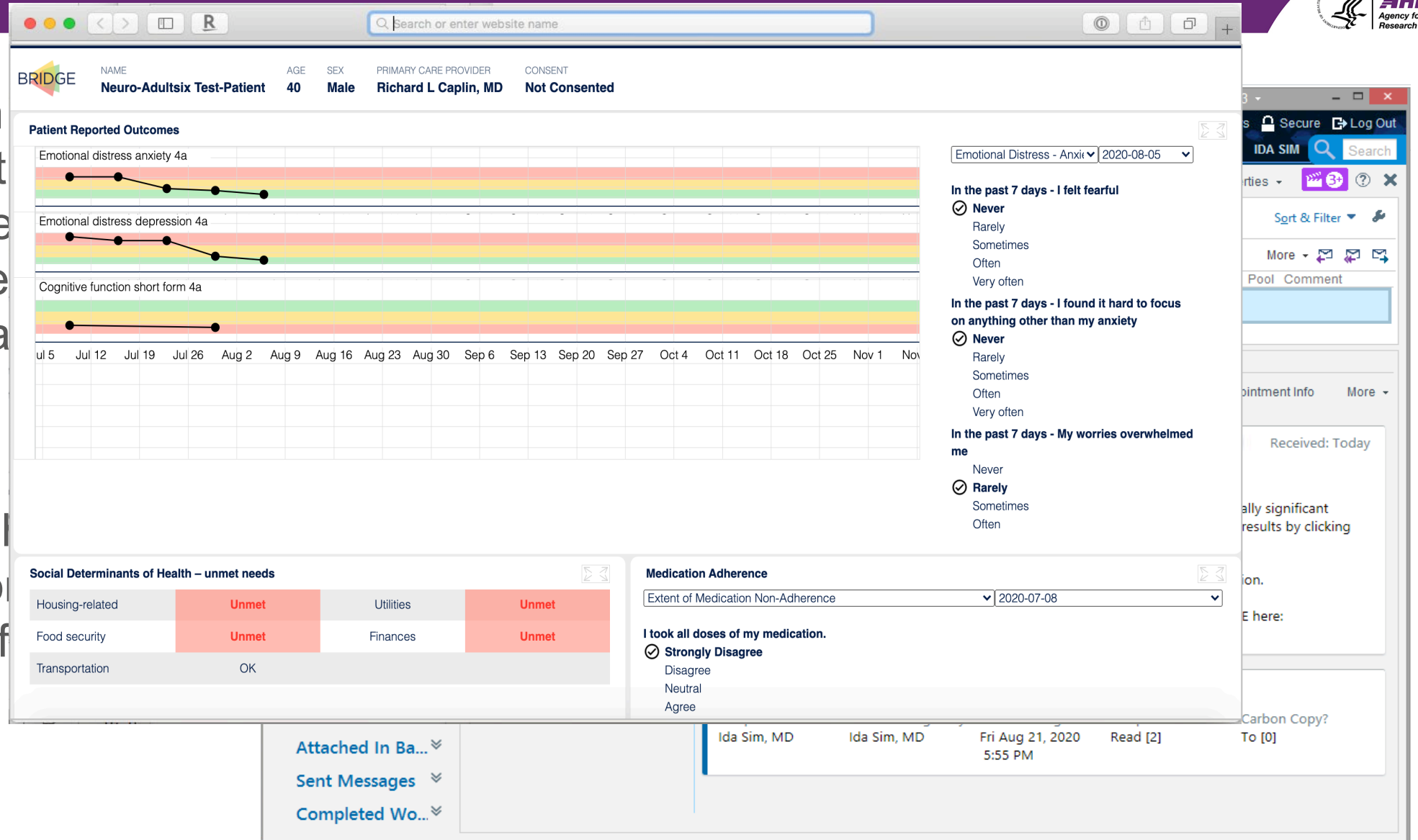
Message Recipients and Status

Recipient	Status Changed By	Status Changed at	Recipient Status	Carbon Copy?
Ida Sim, MD	Ida Sim, MD	Fri Aug 21, 2020 5:55 PM	Read [2]	To [0]

In-Basket: Threshold Warning to PCP

In between visits, if patient PRO exceeds clinical threshold, PCP gets a message.

e.g., Ms. C. GAD-7 score (threshold for is 10)



BRIDGE NAME: Neuro-Adultsix Test-Patient AGE: 40 SEX: Male PRIMARY CARE PROVIDER: Richard L. Caplin, MD CONSENT: Not Consented

Patient Reported Outcomes

Emotional distress anxiety 4a

Emotional distress depression 4a

Cognitive function short form 4a

Social Determinants of Health – unmet needs

Housing-related	Unmet	Utilities	Unmet
Food security	Unmet	Finances	Unmet
Transportation	OK		

Medication Adherence

Extent of Medication Non-Adherence: 2020-07-08

I took all doses of my medication.

☒ Strongly Disagree

Disagree

Neutral

Agree

Attached In Basket

Sent Messages

Completed Work

Ida Sim, MD

Ida Sim, MD

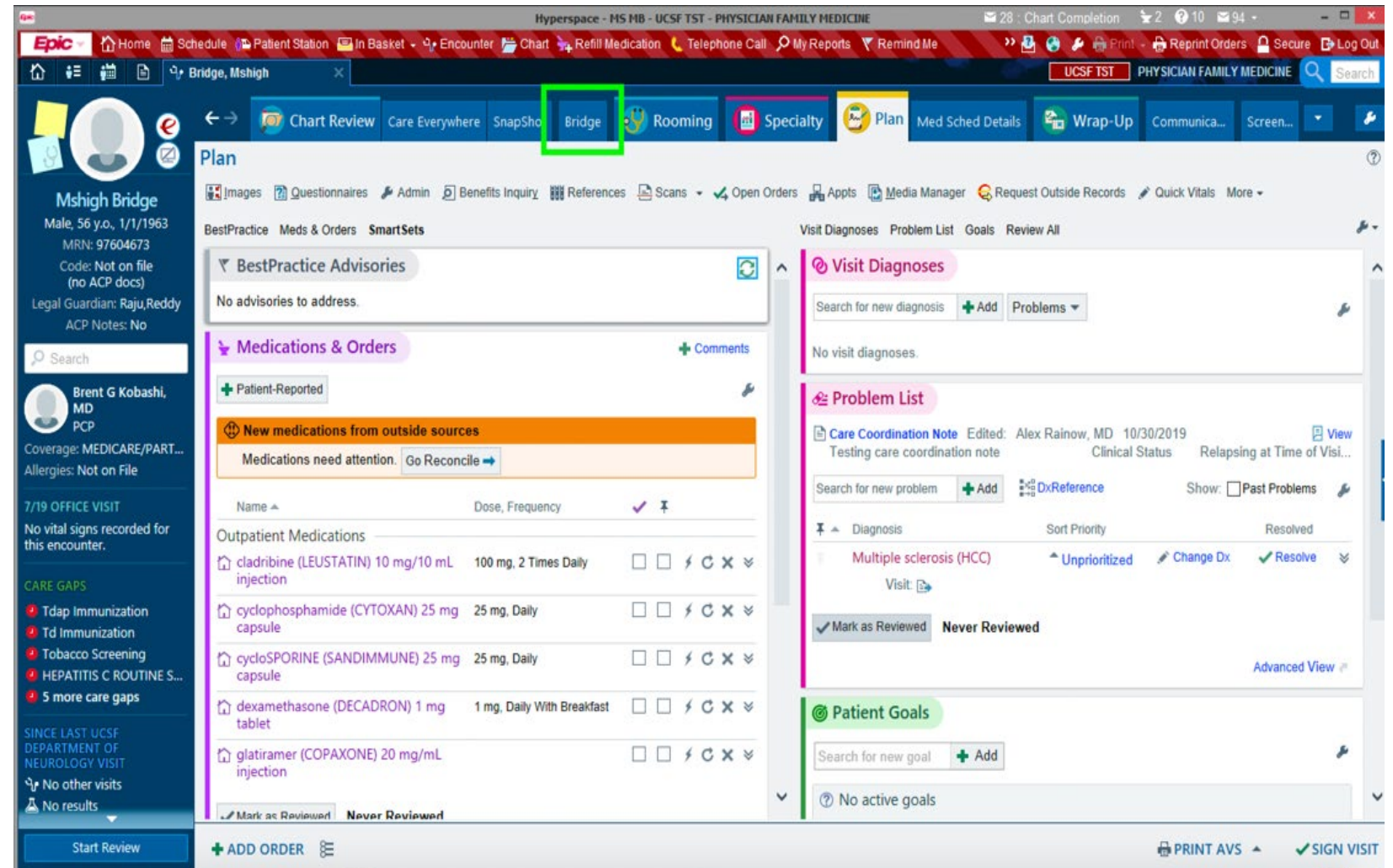
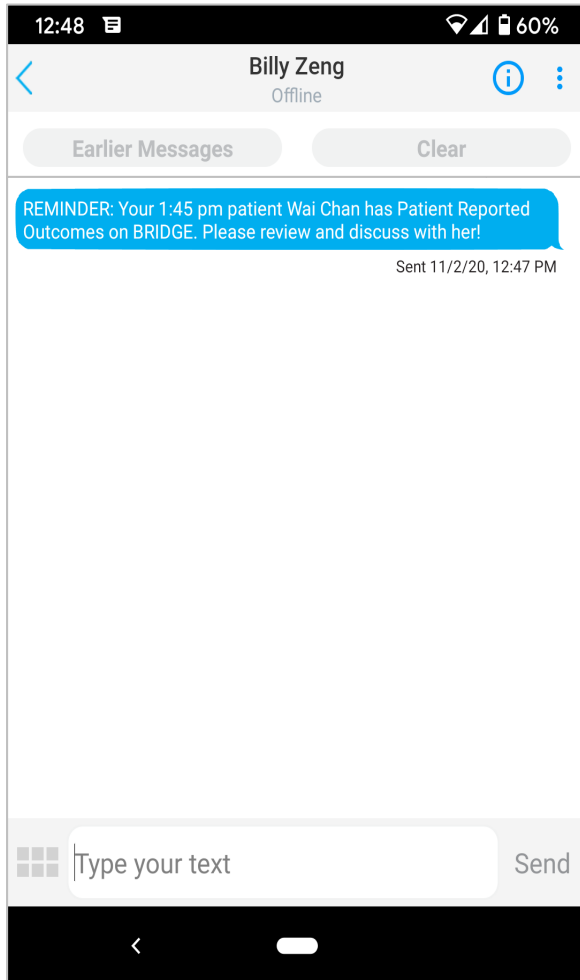
Fri Aug 21, 2020 5:55 PM

Read [2]

To [0]

During Scheduled Visit

Day of visit: secure text reminder via Voalte



During visit: click on BRIDGE tab during in-person, telehealth, or telephone encounter

Reflections from mPROVE Project



Patient-reported Outcomes

- ▶ Multiple UCSF clinics and research projects interested in collecting PROs, as is health center
- ▶ Need both general PROs and condition-specific PROs
- ▶ To facilitate longitudinal PRO collection, PROs need to be useful to the patient *first and foremost*: clear purpose; salience; language, cultural, and health literacy concordance

Workflow integration

- ▶ Exploit FHIR APIs and SMART-on-FHIR protocols to automate and integrate
- ▶ Use pre-existing workflows where possible
- ▶ COVID times: minimize In Basket messages! and no tech or workflow burden on clinical staff

But we have to stop building one-off solutions!

Digital Monitoring for Virtual Care

- Patient-generated data (PGD) are a remote window into patient health states
 - ▶ patient-reported outcomes (PROs)
 - ▶ home medical devices (e.g., BP cuffs, glucometers), wearables (e.g., FitBit, AppleWatch), other sensors
- How to get from here to there?



1000 flowers blooming



Small individualized
bouquets for diverse
users

Pain Points (Health System Perspective)

Technical and Governance

- Multiple projects are (re)-building the same PGD ingestion & storage infrastructure with security, cost, and quality downsides
- Fragmentation impedes governance over PGD projects

Patient Trust

- Lack of unified view of patient-specific PGD data flows impedes data oversight and may undermine patient trust

Precision Medicine / Learning Health System

- Heterogeneity of data collection, formats, and patient consent impedes use of PGD for model building
- Duplication and heterogeneity of end-user systems impedes delivery of decision support to clinicians and patients

Digital Monitoring Using Only Epic/MyChart

Pros

- Med center has full control, lower security risks
- All clinical units use the same approach
- Remote data is stored in Epic for billing
- Clinicians can see remote and clinic-captured data together
- Device agnostic: works for any BP cuff integrating with HealthKit or GoogleFit
- MyChart is a trusted “one-stop shop” for many patient EHR activities

Cons

- MyChart is not that user-friendly
- MyChart does not support character-based languages like Chinese
- Forces Android patients to share data with Google (HealthKit data stays on the iPhone)
- How does digital health research fit in?
 - ▶ Restricted to using only Epic’s decision support tools
 - ▶ Restricted to Epic’s user interface
 - ▶ Restricted to commercial devices that integrate with HealthKit or GoogleFit
 - ▶ MyChart does not support patient-facing data-driven decision support

Towards Individualized Bouquets



1000 flowers blooming



Modular,
standards-based
PGD



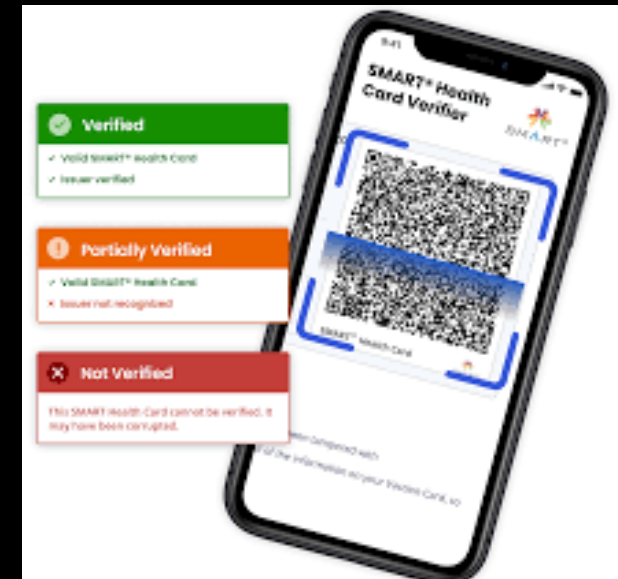
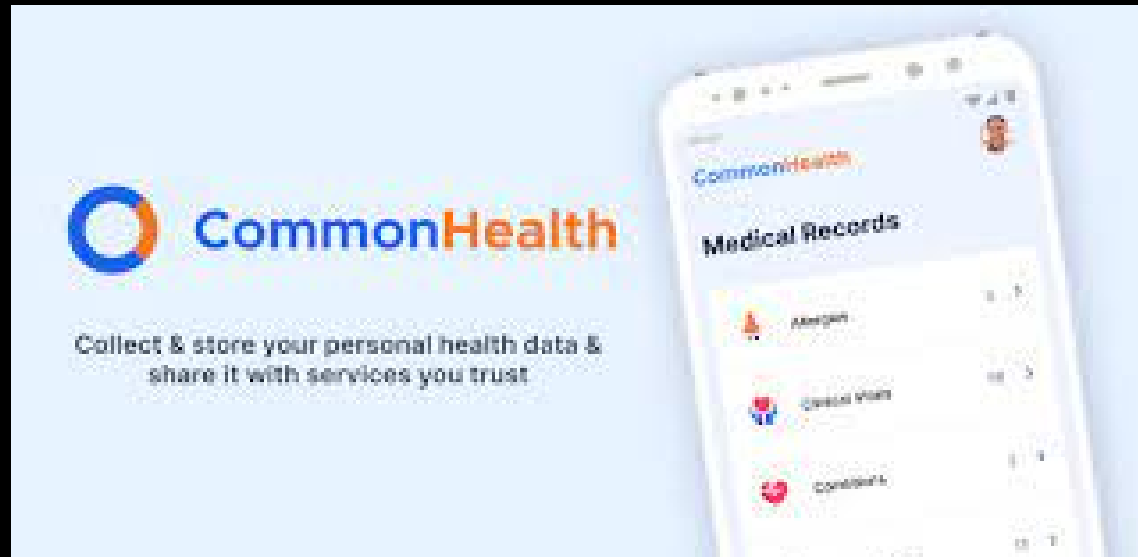
Small individualized
bouquets for diverse
users



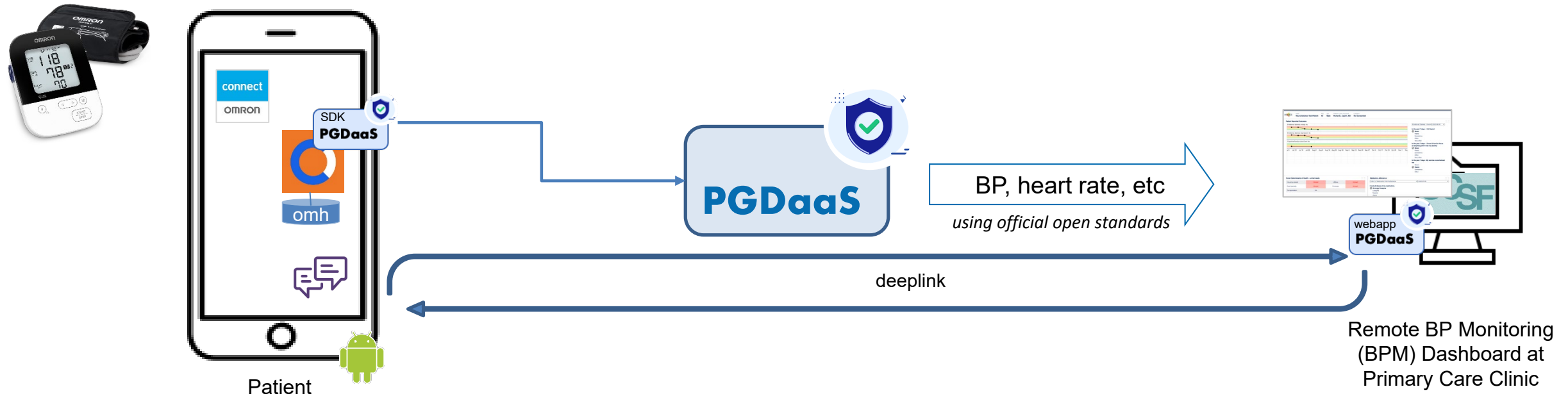
The Commons Project

Independent Nonprofit Public Trust

The Commons Project is a 501c3 non-profit public trust, established to build digital services that **put people first**. The Commons Project fills the void between tech companies, government agencies, and traditional non-profits to build and operate the digital services that constitute public infrastructure for the digital era.



PGDaaS: A Public Utility



Use CommonHealth app to collect PGD under the CommonTrust Network

Standardized open public aggregator

PGD Client

Summary

- PROs for multiple chronic conditions need to be useful first and foremost for the patient
- PRO display and decision support can be integrated into workflow using SMART-on-FHIR
- PGD are a window into patient health states
 - ▶ To address multiple chronic conditions, PGD must be useful and usable *in individualized combinations* for each patient (i.e., individualized bouquets)
 - ▶ To be sustainable in the long run, health systems must be able to govern and manage PGD collection and usage while maintaining patient trust
- A public digital utility that serves PGD as standards-based data can anchor a modular, flexible, trustworthy PGD ecosystem

mPROVE/PGDaaS Team

TCP



JP Pollak



Adrian Sogohian



James Kizer

DGIM



Ida Sim



Tung Nguyen



Mitch Feldman



Jason Satterfield



Jane Jih



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AGENCY FOR HEALTHCARE RESEARCH AND QUALITY



Transforming Healthcare Through Patient-Generated Health Data Integration

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Overview

What are the practical issues with use of PGHD streams in ambulatory EHR systems?

- Initiate
- Configure
- Secure
- Analyze/Summarize
- Reintegrate, including workflows

Approaches To Integrate PGHD

- EHR resources
 - ▶ Captive or "Kiosk" mode—secure, private, but logistically difficult
 - ▶ Tethered portal
- Smart-on-FHIR interaction with a gateway and a mobile app
- Deep Linkage plus gateway sets up 2-way communications with app or REDCap

Patient Data Entry in Captive Mode: Intimate Partner Violence Screening In Primary Care R18: HS025654

Questionnaires - Zzztest, Upgrade

This is a non-production environment. If you are a patient, contact the system administrator immediately. [X]

Healthy Relationships Screening

For an upcoming appointment with **Terrence E Steyer, MD** on 3/10/2020

Because violence is common in many people's lives and can impact health, we would like to ask you a few questions about safety in your relationship. Your answers on this self-report measure will be confidential and no one will take action based upon your responses on this screening without further speaking with you. Your doctor may follow-up with you about the information you provide to ensure your safety.

* Indicates a required field.

* Have you been hit, kicked, punched, pushed, shoved, or otherwise hurt by someone at home in the past year?

Yes No Prefer not to answer

* Do you feel safe in your current relationship?

Yes No Not Applicable Prefer not to answer

* Is there a partner from a previous relationship who is making you feel unsafe now?

Yes No Prefer not to answer

CONTINUE FINISH LATER CANCEL

Proceed to next page

High Contrast Theme

Questionnaires - Zzztest, Upgrade

This is a non-production environment. If you are a patient, contact the system administrator immediately. [X]

Healthy Relationships Screening

For an upcoming appointment with **Terrence E Steyer, MD** on 3/10/2020

Has the physical violence increased in frequency or severity over the past year?

Yes No Prefer not to answer

Has your partner (or ex) ever used a weapon against you or threatened you with a weapon?

Yes No Prefer not to answer

Do you believe your partner (or ex) is capable of killing you?

Yes No Prefer not to answer

Is your partner (or ex) violently and constantly jealous of you?

Yes No Prefer not to answer

Has your partner (or ex) ever tried to choke (strangle) you?

Yes No Prefer not to answer

BACK CONTINUE FINISH LATER CANCEL

Proceed to next page

High Contrast Theme

Registry tracks patient screening—BPA reminds provider to convert to captive mode and screen

Confidential documentation

Qira Zzztest
Female, 31 y.o., 1/1/1990
MIDN: 00344389
Code Not on file (has ACP 0003)
LVAO Patient: None
Treatment Team: Huber, Merritt S.
Transplants: None
Attending: Huber, Merritt S., MD
Lab Patient Collection Site: None

COVID-19 Vaccine: Unknown
Intimate Partner Violence
Kimberly McHugh, MD
PCP - General
Merritt S. Huber, MD
Ref Provider
Primary Care: Self Pay
Allergies: Not on File
PCP Status: None
1:00 PM OFFICE VISIT for Hypertension
Height: 54.4 kg (120 lb)
115C days
BP: 110/60
Blood Clotting: Zzztest, Qira

SINCE YOUR LAST VISIT
12 Internal Med (0)
No results
CARE GAPs
COVID-19 Vaccine (1)
INFLUENZA VACCINE

PROBLEM LIST (0)

8/11/2021 visit with Merritt S. Huber, MD for RETURN PATIENT - Test

Current Encounter IPV Questionnaire Response

MUSIC RSCH IPV PT 1

Have you been hit, kicked, punched, pushed, shoved, or otherwise hurt by someone at home in the past year?
Yes
No
If yes, how often? (Select all that apply)

--- Other (Please List) ---
I feel safe
Do you feel safe in your current relationship?
Yes
No
Has violence in your relationship increased since the start of the COVID-19 pandemic?
Yes
No
Has the physical violence increased in frequency or severity since the past year?
Yes
No
Has your partner (or ex) ever used a weapon against you or threatened you with a weapon?
Yes
No
Do you believe your partner (or ex) is capable of killing you?
Yes
No
Is your partner (or ex) violent and consistently against you?
Yes
No
Has your partner (or ex) ever tried to choke (strangle) you?

--- About how long ago?

--- Did it happen more than once?

--- Did you ever lose consciousness or think you might have lost consciousness?
No
2 (High risk for significant physical harm or being killed in the future)
Danger Assessment Total Score
Do you feel in danger right now?
No
8/11/2021

IPV Provider Assessment Smartform

This Smartform is confidential and will not appear anywhere else in the patients chart.

Suggested verbiage for physician

As your doctor, I am concerned about your safety in your relationship. I want you to know that you are not alone and help is available. I do have several follow-up questions that may assist me in best being able to help you.

Provider Follow-up Safety Questions

Does your partner have access to a firearm? Yes No Pt Declined

Facilitated Hand Off to National Hotline




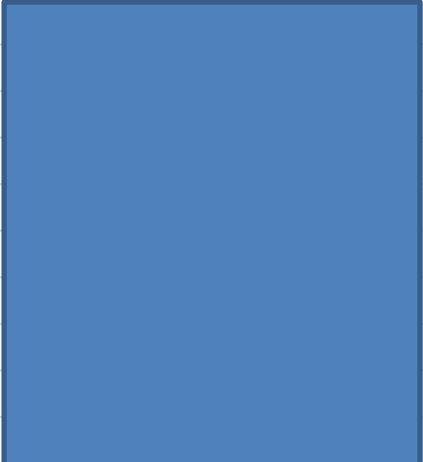










Because of your danger assessment, we are very concerned about this level of danger and are reluctant to have you leave without having more information about safety planning. I understand that it can be intimidating to reach out for help or to know what resources are available. I want to share the number to the National Domestic Violence hotline with you, which is an organization that specializes in providing expert support on relationship abuse and can help connect you to local resources. It is a 24/7 hotline that is confidential, anonymous, free of cost and accessible through phone, chat or text. The advocates at the hotline are highly trained and here to help with whatever you feel ready to do. I can connect you to them if you feel comfortable with that. How does that sound?

Contact National Domestic Violence Hotline: 800.799.7233

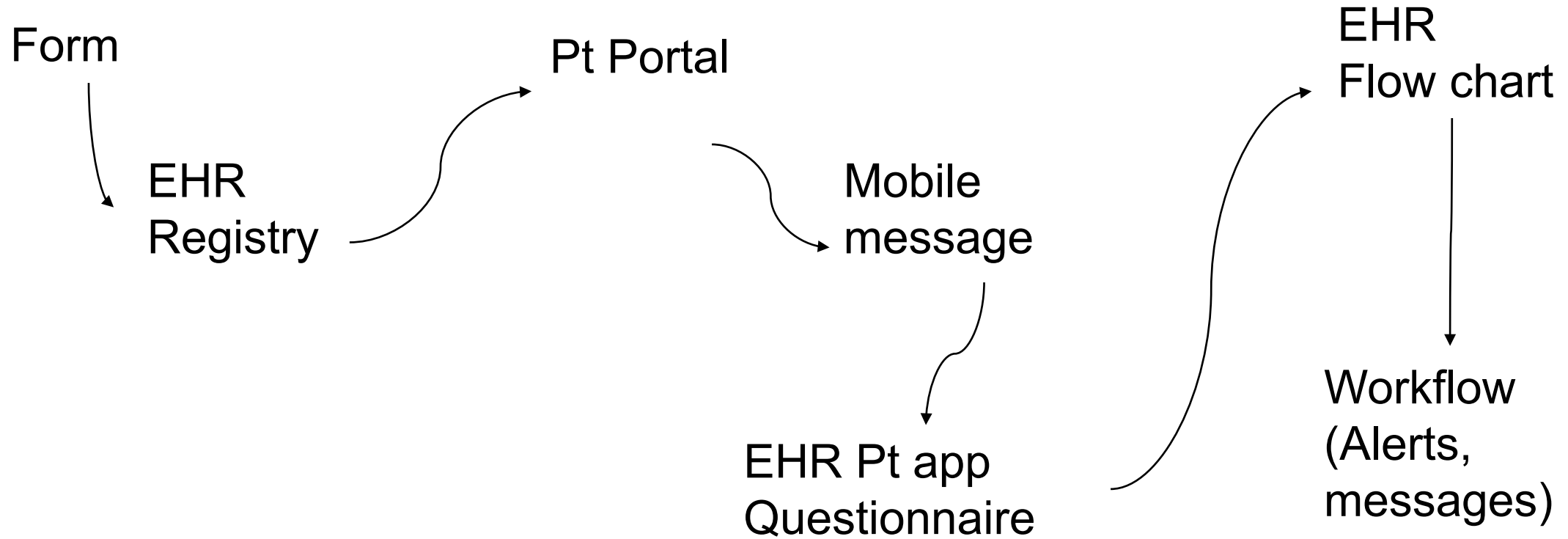
Protocol
1) Call routine with patient in a private room from clinic phone.
2) With patient's permission provide screening results to hotline advocate.

Images used with Permission of Epic Systems

Clinic Compliance With IPV Screening

Period	2021-11-29 to 2021-12-13 						
Visit Count	Questionnaire Status 						
Department	 Eligible/Not Screened	Screened	Total Eligible	Screened %	Positive	False positive	Positive for Research
	15	13	28	 46.43%			
	34	15	49	 30.61%			
	71	23	94	 24.47%			
	9	16	25	 64.00%			
	9	25	34	 73.53%			
	51		51	0.00%			
	27	8	35	 22.86%			
	5	10	15	 66.67%			
	22	7	29	 24.14%			
	15	9	24	 37.50%			
Total Eligible	258	126	384	 32.81%	0	0	0

Tethered Example in Epic



COVID-19 Example

COVID-19 Triage

Medical Risk Assessment Conditions

+ Chronic Lung Disease	—	+ Diabetes Melitus	—	+ Cardiovascular Disease	—
+ Chronic Renal Disease	—	+ Chronic Liver Disease	—	+ Immunocompromised Conditions	—
+ Neurologic/Neurodevelopmental	—	+ Other Chronic Diseases	—	+ Currently Pregnant	—
+ Headache	—	+ Former Smoker	—	Age:	<input type="button" value="60-70"/> <input type="button" value="70-80"/> <input type="button" value=" >80"/>

Other conditions:

Review of Symptoms

+ Fever > 100.4F (38.0C)	—	+ Subjective Fever	—	+ Chills	—
+ Muscle Aches	—	+ Runny Nose	—	+ Sore Throat	—
+ Cough	—	+ Shortness of Breath	—	+ Nausea and Vomiting	—
+ Headache	—	+ Abdominal Pain	—	+ Diarrhea	—

Illness Onset Date:

Testing Date:

Testing Site:

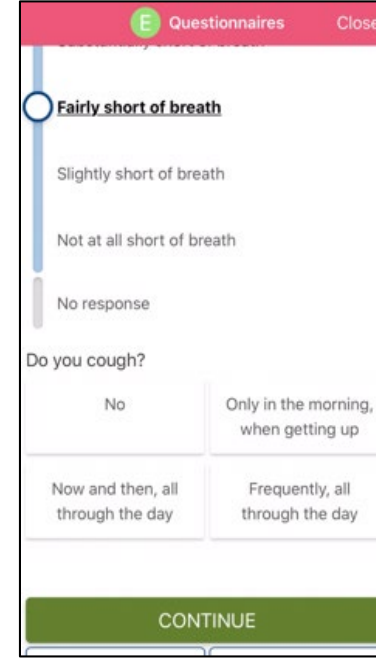
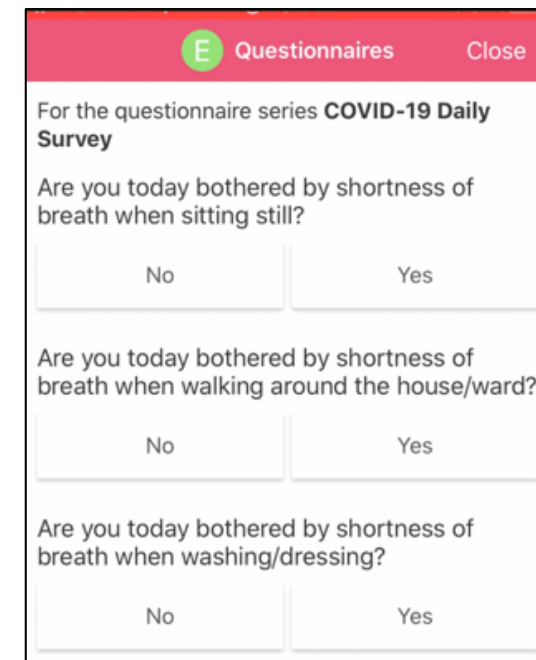
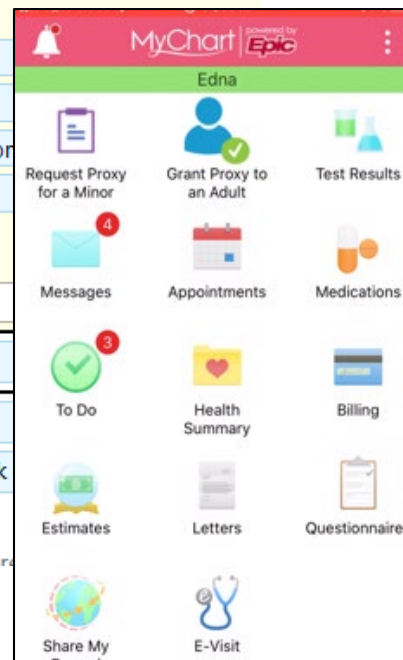
Patient Presentation

Exposure Risk

High Risk

- Living in the same household as someone with symptomatic and confirmed COVID-19 without using a mask

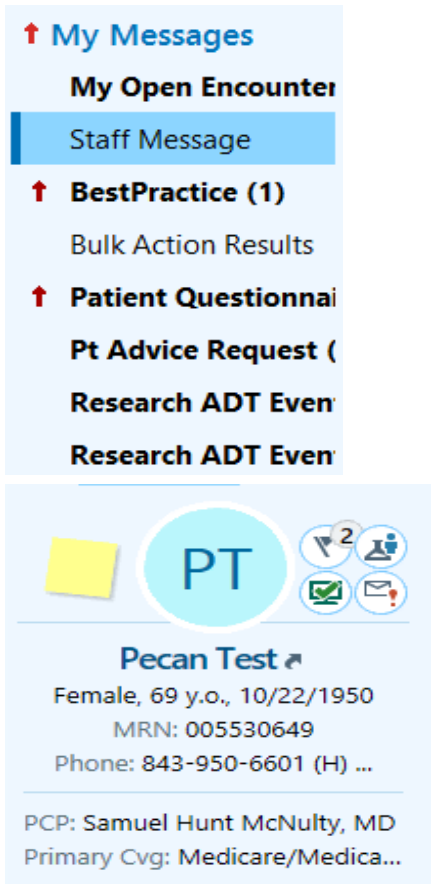
MyChart App



Images used with Permission of Epic Systems

Provider Review of Data

Alerts to in-basket



My Messages

My Open Encounter

Staff Message

BestPractice (1)

Bulk Action Results

Patient Questionnaire

Pt Advice Request (1)

Research ADT Event

Research ADT Event

Pecan Test

Female, 69 y.o., 10/22/1950

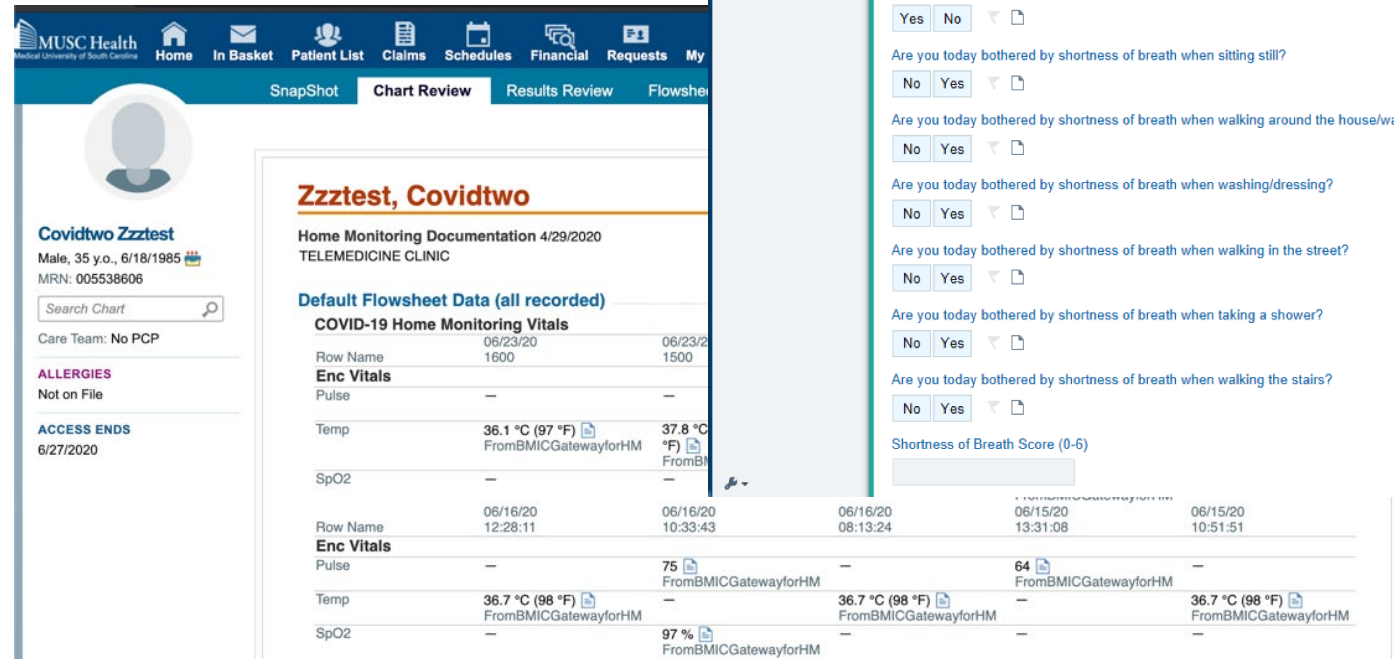
MRN: 005530649

Phone: 843-950-6601 (H) ...

PCP: Samuel Hunt McNulty, MD

Primary Cvg: Medicare/Medicaid

Flow sheet of PDHD



MUSC Health

Home In Basket Patient List Claims Schedules Financial Requests My

Snapshot Chart Review Results Review Flowsheet

Covidtwo Zzztest

Male, 35 y.o., 6/18/1985

MRN: 005538606

Care Team: No PCP

ALLERGIES

Not on File

ACCESS ENDS

6/27/2020

Zzztest, Covidtwo

Home Monitoring Documentation 4/29/2020

TELEMEDICINE CLINIC

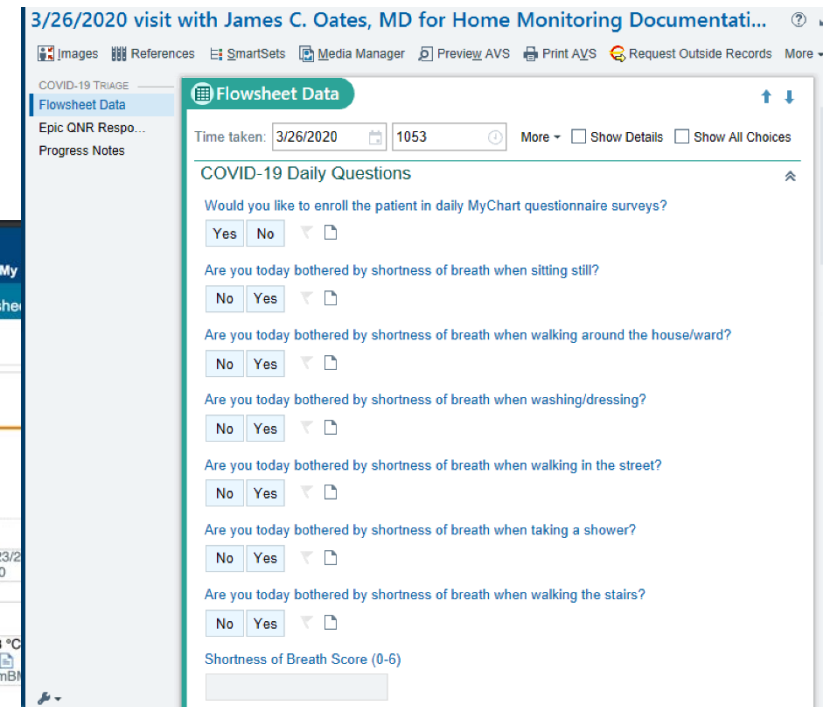
Default Flowsheet Data (all recorded)

COVID-19 Home Monitoring Vitals

Row Name	06/23/20 1600	06/23/20 1500
Enc Vitals		
Pulse	—	—
Temp	36.1 °C (97 °F) FromBMICGatewayforHM	37.8 °C (99 °F) FromBMICGatewayforHM
SpO2	—	—

Row Name	06/16/20 12:28:11	06/16/20 10:33:43	06/16/20 08:13:24	06/15/20 13:31:08	06/15/20 10:51:51
Enc Vitals					
Pulse	—	75 FromBMICGatewayforHM	—	64 FromBMICGatewayforHM	—
Temp	36.7 °C (98 °F) FromBMICGatewayforHM	—	36.7 °C (98 °F) FromBMICGatewayforHM	—	36.7 °C (98 °F) FromBMICGatewayforHM
SpO2	—	97 % FromBMICGatewayforHM	—	—	—

Nurse encounter interface



3/26/2020 visit with James C. Oates, MD for Home Monitoring Documentati...

Images References SmartSets Media Manager Preview AVS Print AVS Request Outside Records More

COVID-19 TRIAGE

Flowsheet Data

Time taken: 3/26/2020 1053 More Show Details Show All Choices

COVID-19 Daily Questions

Would you like to enroll the patient in daily MyChart questionnaire surveys?

Yes No

Are you today bothered by shortness of breath when sitting still?

No Yes

Are you today bothered by shortness of breath when walking around the house/ward?

No Yes

Are you today bothered by shortness of breath when washing/dressing?

No Yes

Are you today bothered by shortness of breath when walking in the street?

No Yes

Are you today bothered by shortness of breath when taking a shower?

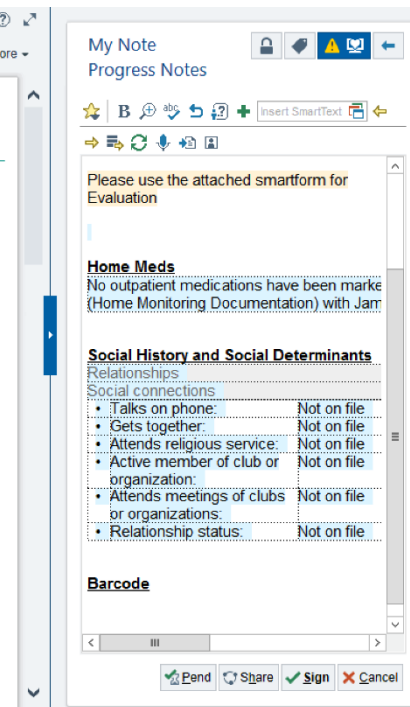
No Yes

Are you today bothered by shortness of breath when walking the stairs?

No Yes

Shortness of Breath Score (0-6)

Note being authored



My Note

Progress Notes

Please use the attached smartform for Evaluation

Home Meds

No outpatient medications have been marked (Home Monitoring Documentation) with Jan

Social History and Social Determinants

Relationships

Social connections

- Talks on phone: Not on file
- Gets together: Not on file
- Attends religious service: Not on file
- Active member of club or organization: Not on file
- Attends meetings of clubs or organizations: Not on file
- Relationship status: Not on file

Barcode

Pend Share Sign Cancel

Care for COVID-19 Patients at Home at High Risk for Complications



TMR-2021-0020-ver9-Ford_1P

Type: other

Telemedicine
Reports

Mary Ann Liebert, Inc.  publishers

Telemedicine Reports
Volume 2.1, 2021
DOI: 10.1089/tmr.2021.0020
Accepted September 3, 2021

SHORT REPORT

Open Access

Journal of the American Medical Informatics Association

Advance Access

Not Home Alone: Leveraging Telehealth and Informatics to Create a Lean Model for COVID-19 Patient Home Care

Research and Applications

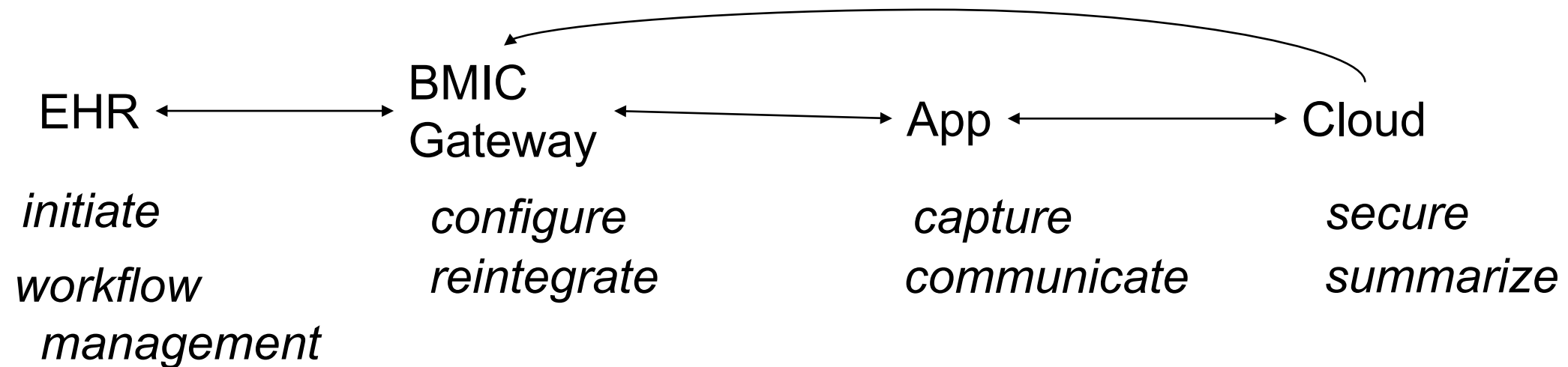
► Dee Ford,¹ Emily Warr,² Cheryl Hamill,² Wenjun He,³ Ekatrina Pekar,⁴ Jillian Harvey,^{5,*} Ragan DuBose-Morris,² Kimberly McGhee,^{3,6} Kathryn King,⁷ and Leslie Lenert⁸

**Leveraging health system telehealth and informatics
infrastructure to create a continuum of services for
COVID-19 screening, testing, and treatment**

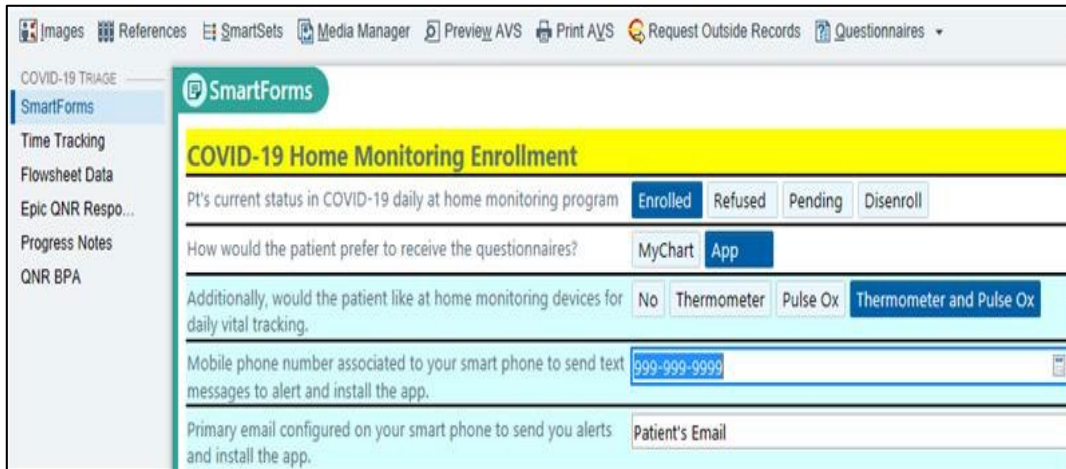
Dee Ford,¹ Jillian B. Harvey,² James McElligott,³ Kathryn King,³ Kit N. Simpson,² Shawn Valenta,⁴ Emily H. Warr,⁴ Tasia Walsh,⁴ Ellen Debenham,⁴ Carla Teasdale,⁵ Stephane Meystre,⁶ Jihad S. Obeid ,⁷ Christopher Metts,⁸ and Leslie A. Lenert⁹

Generalizing to Apps: Components

- EHR customization and workflow
- Standards-based gateway functionality (middleware)
- App-based functionality
- Cloud-based pre-processing

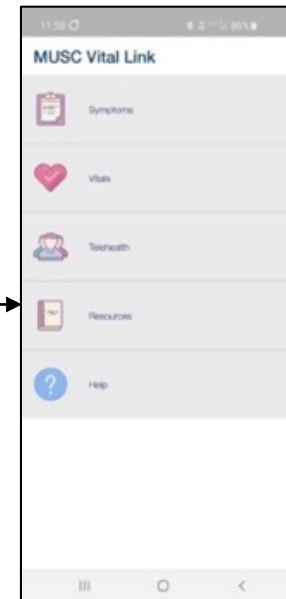
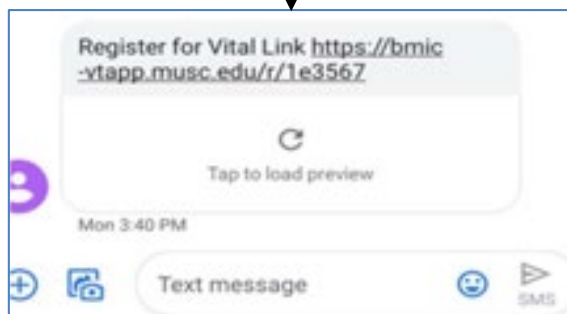


Deep Linkages for App Configuration



The screenshot shows a web-based form titled "COVID-19 Home Monitoring Enrollment" under the "SmartForms" header. The form includes several sections: "Pt's current status in COVID-19 daily at home monitoring program" with buttons for "Enrolled", "Refused", "Pending", and "Disenroll"; "How would the patient prefer to receive the questionnaires?" with buttons for "MyChart" and "App"; "Additionally, would the patient like at home monitoring devices for daily vital tracking?" with buttons for "No", "Thermometer", "Pulse Ox", and "Thermometer and Pulse Ox"; "Mobile phone number associated to your smart phone to send text messages to alert and install the app." with a text input field containing "999-999-9999"; and "Primary email configured on your smart phone to send you alerts and install the app." with a text input field labeled "Patient's Email".

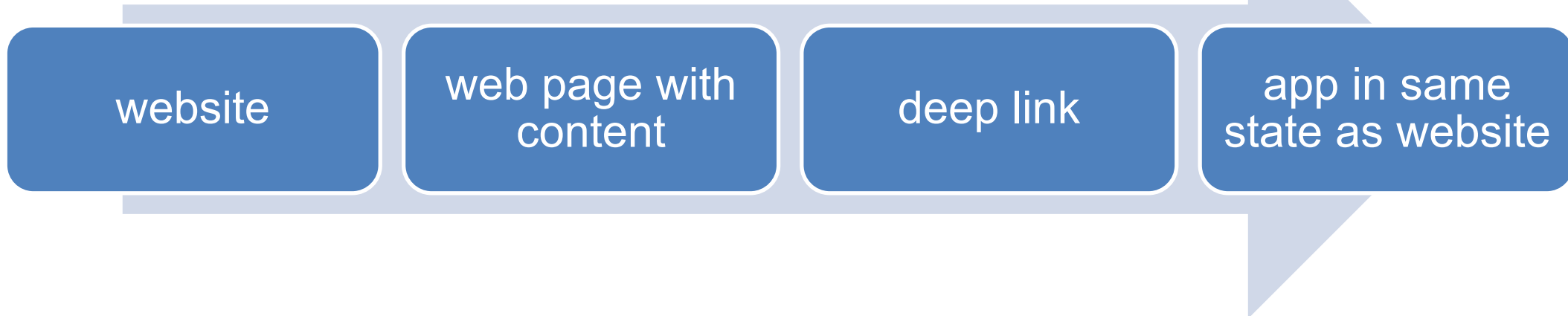
Prescribe
and
configure
and app



1. (app downloaded)
2. Text message with URL sent
3. Deep link opens app and redirects in app
4. Patient initiates configuration in app
5. App receives encrypted linking identifier
6. App receives instruction for monitoring

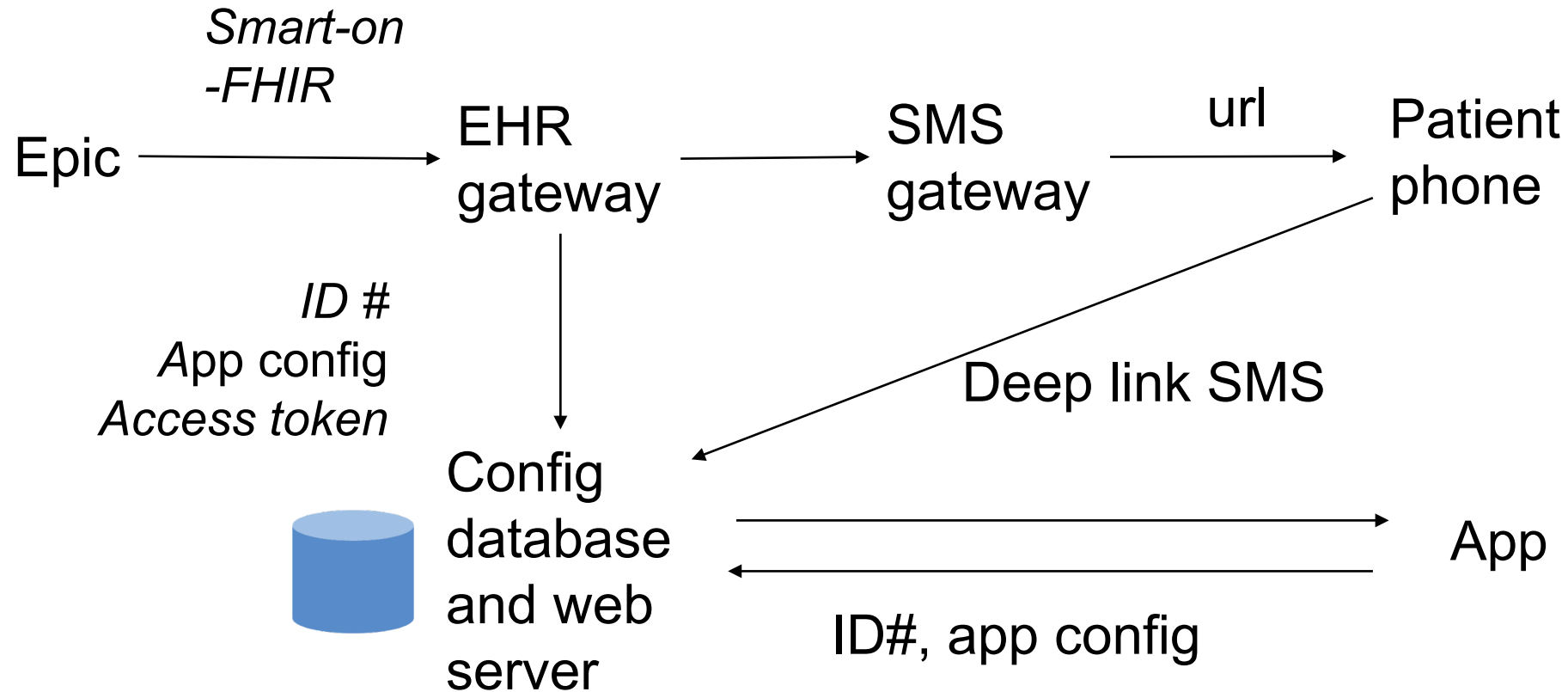
What Is A Deep Linkage?

- Deep linkages are URLs that trigger an operating system level function to move a person browsing a website from the browser to view the same content (and maintain the same state) in the corresponding app.

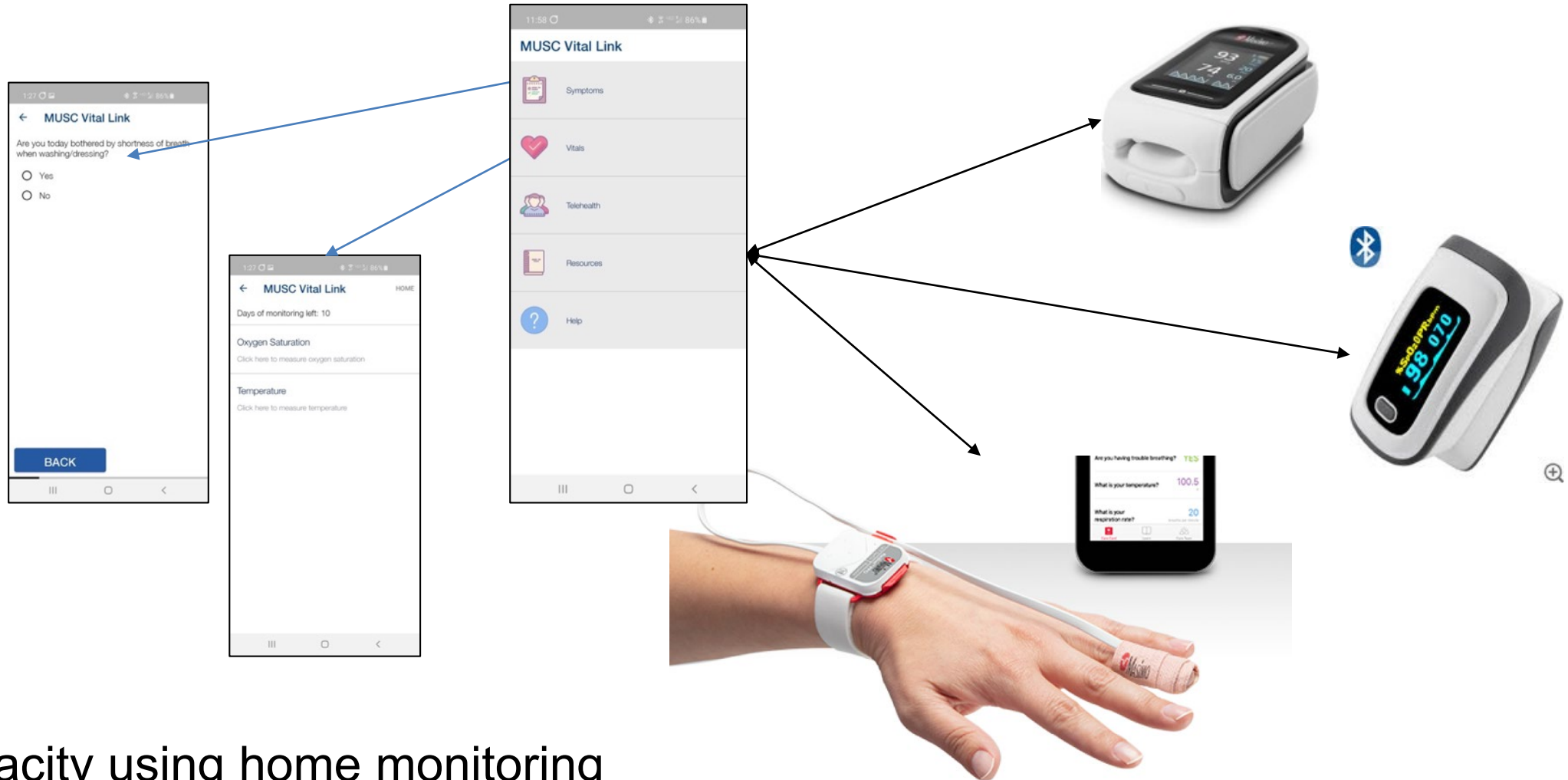


We apply deep linkages to send information between EHR and an app (in this case a consent website) to configure the app

Initiation



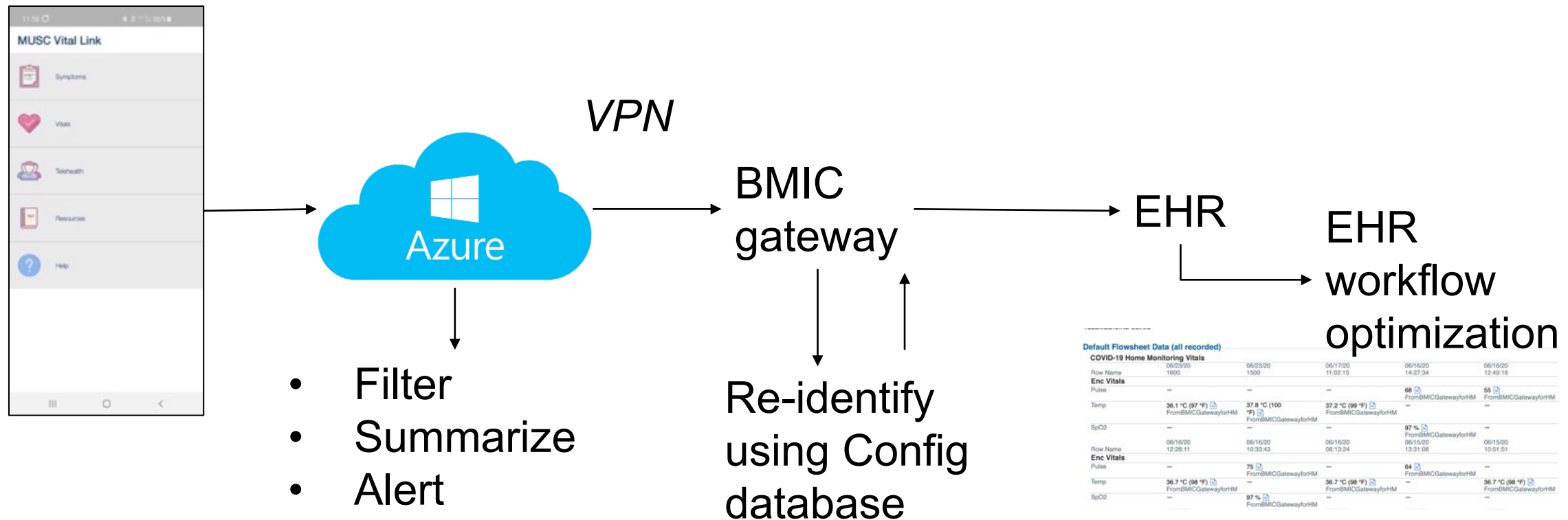
App Configuration: Questionnaires and Devices



Surge capacity using home monitoring
TATRC contract

Secure Reintegration of Data

Avoiding direct connections from “unsupervised” devices to gateway middleware for security



In Our DNA SC Enrollment

In Our DNA SC is a Precision Medicine Research initiative in collaboration with Helix. This initiative will recruit and sequence the DNA of 100,000 South Carolinians.

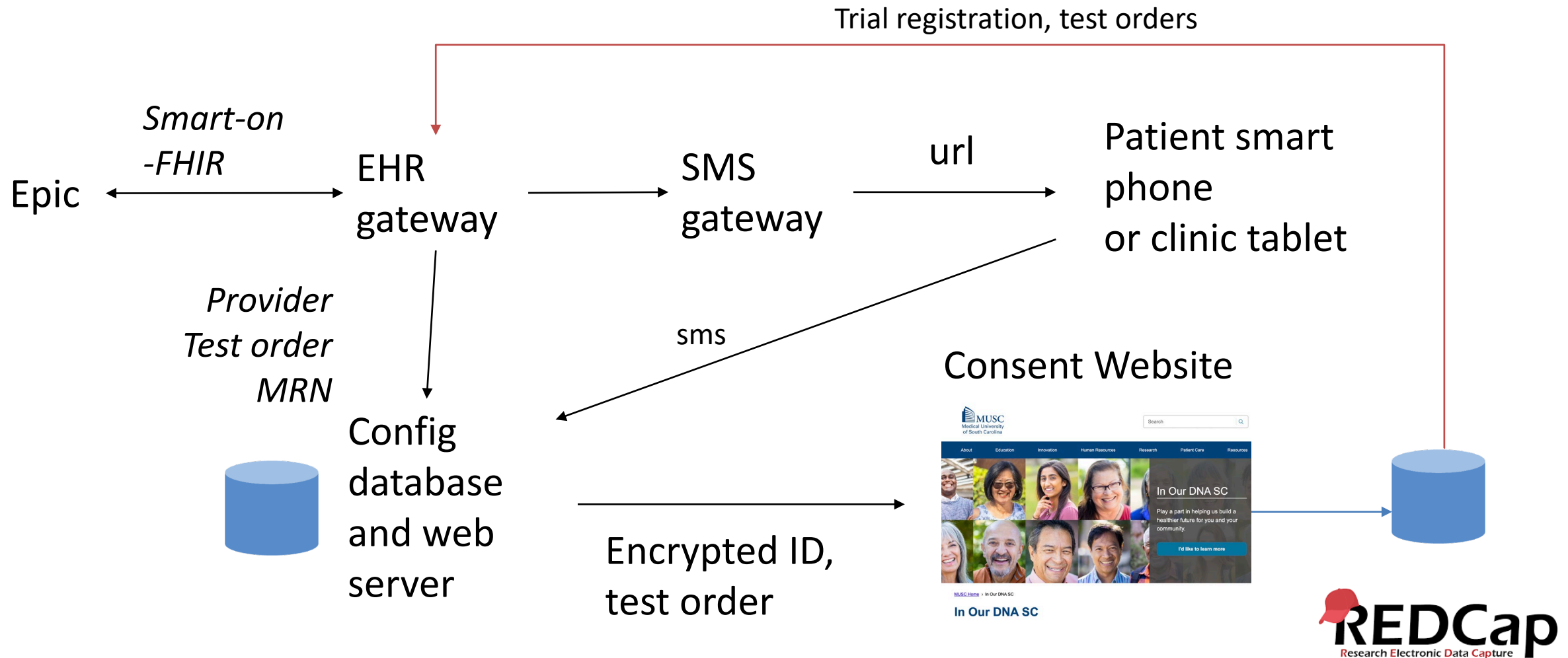


In Our DNA SC

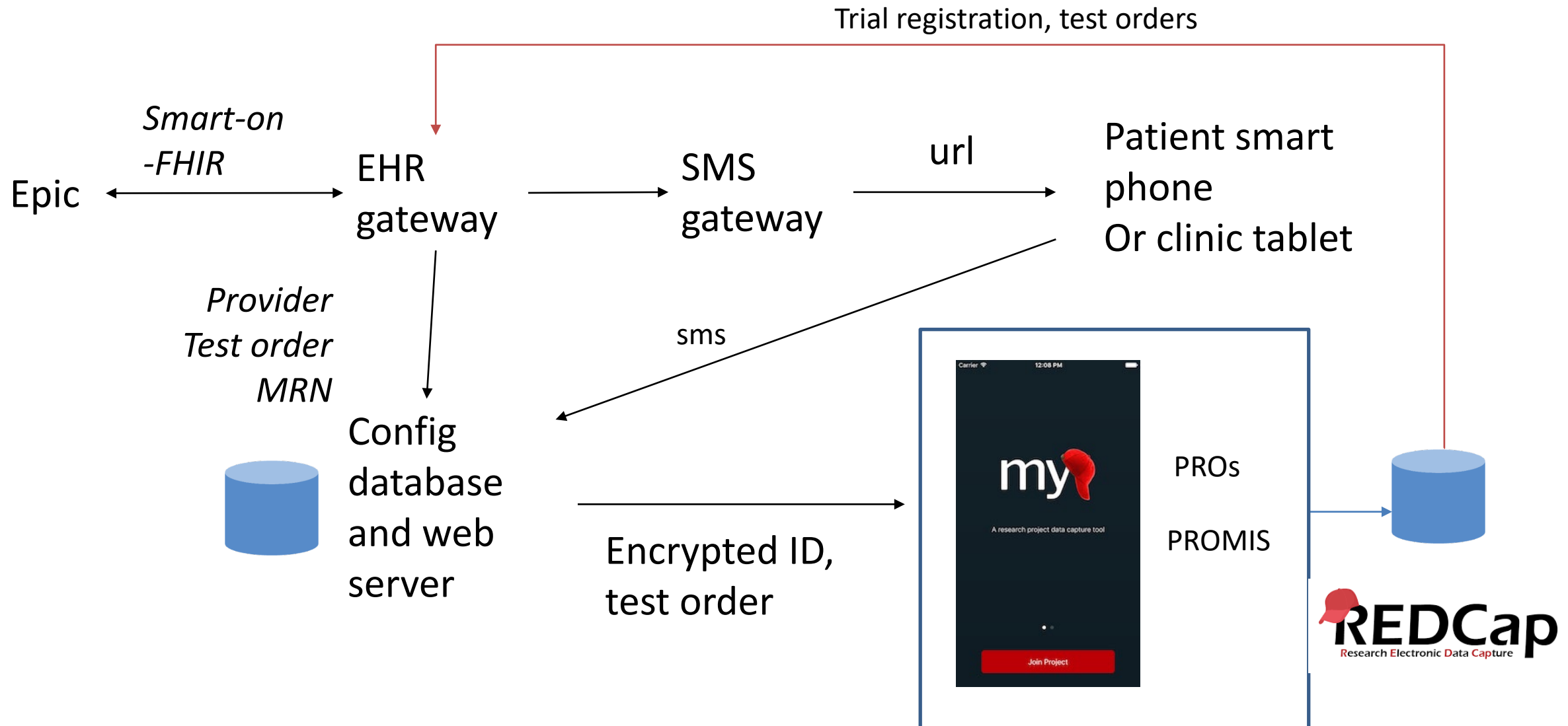
Play a part in helping us build a healthier future for you and your community.

[I'd like to learn more](#)

Deep Linkage to REDCap and Back to Epic



Deep Linkage to REDCap and Back to Epic



Summary

- **Tethered systems are practical and capable**
 - ▶ Capture mode (kiosk) good for confidential PGHD (IPV)
 - ▶ Workflow integration is much easier with tethered systems
- **App integration requires some infrastructure**
 - ▶ Gateway for app connections (read, write back)
 - ▶ Cloud filtering enhances security
- **SMS Deep Linkages add capability to apps**
 - ▶ Confidential record linkage with app
 - ▶ App configuration
 - ▶ Extends to REDCap and potentially other PRO platforms

Contact Information

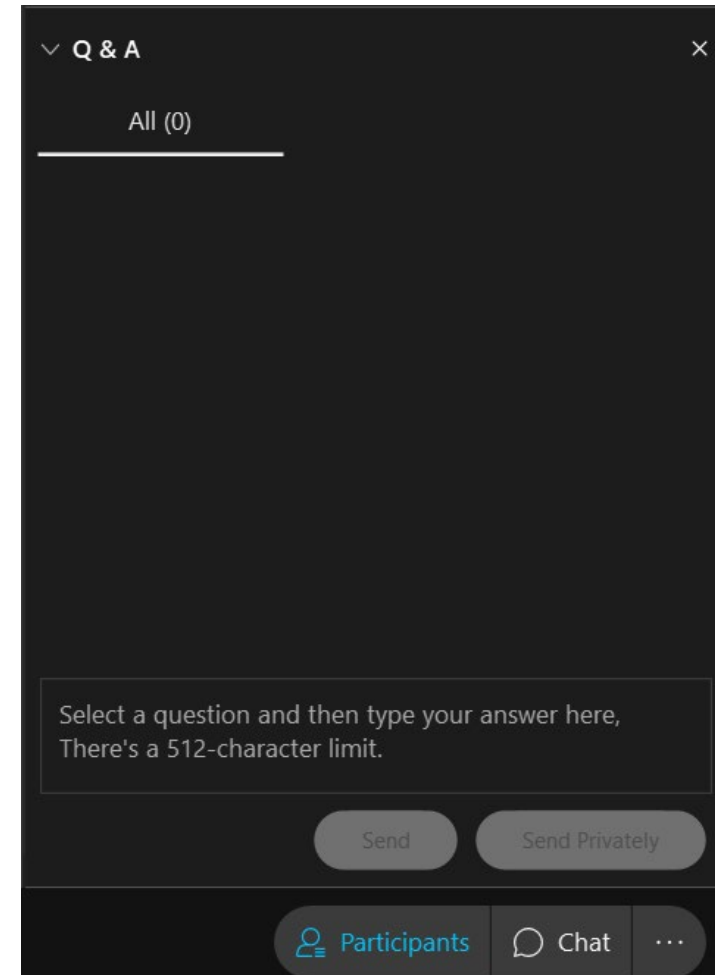


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How to Submit a Question

- At any time during the presentation, type your question into the “Q&A” section of your WebEx Q&A panel
- Please address your questions to “All Panelists” in the drop-down menu
- Please include the presenter’s name or their presentation order number (first, second, or third) with your question
- Select “Send” to submit your question to the moderator
- Questions will be read aloud by the moderator

A screenshot of the WebEx Q&A panel interface. At the top, it says "Q & A" with a dropdown arrow and a close button. Below that, it says "All (0)". The main area is a large text input field with a placeholder that reads: "Select a question and then type your answer here, There's a 512-character limit." At the bottom of the input field are two buttons: "Send" and "Send Privately". At the very bottom of the panel are three tabs: "Participants" (with a person icon), "Chat" (with a speech bubble icon), and a menu icon (three dots).

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